The
Electrical Review

VOL. CXII. MAY 19, 1933. No. 2895.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY. Price 6d.

THE ELECTRICAL REVIEW, DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1.

Telegraphic Address: "AGEEKAY, WATLOO, LONDON." Code, A B C. Telephone No.: Hop 3333 (50 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

Principal Contents:

	PAGE
The Institution and the Industry	693
A Cotton Mill Change-over. By G. T. Allcock	695
Transformer Oil. By John P. Murrough	698
Glasshouse Horticulture. By E. S. Shoults	699
The Nearly All-electric House. By E. T. Barton	700
Electricity in Gasworks. By C. H. S. Tupholme	701
Welding Stainless Steel. By D. S. Black	702
Switchgear for Swansea	703
A New Synchronous Motor	704
Correspondence: Baking Opportunities Missed; What is a Consultant?; The Trade and Overlapping; Women or Men Demonstrators?; Bare-neutral Wiring; Domestic Water Heating; The Electrical Association for Women; Electric and Oil Heating	705
Cooker Construction	708
New Apparatus and Devices	709
"Northmet" Showrooms	711
Parliamentary News	712
Business and Industrial Notes	713
Electricity Supply	717
Traction	719
Communications	719
Contract Information	720
Notes	721
Our Personal Column	722
New Companies Registered	723
Returns of Electrical Companies	723
City Notes	724
Stocks and Shares	725
Published Specifications	727
New Work for Contractors	728

The Institution and the Industry

THE presentation of the annual report of the Council of the Institution of Electrical Engineers provides an opportunity for reviewing the work of our premier technical association. Like other venerable and authoritative bodies, the I.E.E. is apt to be taken for granted, and its labours (that is to say the labours of honorary as well as permanent officials) in the cause of electrical progress are often only dimly recognised.

The Institution was formed to promote the general advancement of electrical and engineering science and to facilitate the exchange of information and ideas on the subject. It fulfils these duties not only in London but also in each of the Centres and Sub-Centres which form an essential and very live part of the Institution as we know it. That the Institution interprets its obligations in no narrow sectarian spirit is indicated by the free use of its premises accorded to kindred societies for 205 meetings during the past year, as well as by the committee work carried out in collaboration with other societies and with universities in the furtherance of the larger aims of engineering.

Is our industry making the most of the Institution? The total membership of the seven grades is very little over 15,000, and this includes by no means all who are eligible. Even of that figure less than 2,000 are enrolled as full members; we believe that the technical qualifications of an appreciable proportion of the 6,000 associate members are such as to make them suitable for inclusion in the higher grade. We have met many men, too, who feel that they are past their examination days, and who are unaware that the usual preliminary to associate membership can be obviated by the submission of a thesis in proof of their capability.

The Institution, we are glad to note, does not mind losing money in encouraging student membership, which now numbers 3,450 (including 1,400 graduates under twenty-eight years of age). A ninth section, at Bristol, was formed last year. These form the nucleus of the corporate membership of the future; but are they doing all they might to fit themselves for this responsibility? The average attendance at the special students' lectures delivered in ten of our largest cities was only 18.5 per cent. of the membership of the sections. On the other hand, a distinct improvement in attendances at the informal meetings in London is recorded, and these are mainly comprised of the younger engineers.

The grade of companion is not making the headway that might have been hoped, considering the field of usefulness that it opens to men of administrative non-technical experience.

Membership of the I.E.E. should be regarded as a privilege. The healthy state of its finances makes it independent of any increase in numbers. Nevertheless, for the sake of the wider interests of the industry, more men should seek to be associated with its work.

The Drop in Output

FOR the first time since the beginning of the present trade depression, the Electricity Commissioners' monthly returns record a lower output than for the same month of the preceding year. Last month 952 million kWh was generated, as compared with 988 million kWh in April, 1932—a decrease of 36 million kWh, or 3.6 per cent. In our issue of February 17th, when commenting on the notable increase last January over that of the previous January, we drew attention to the effect of weather, epidemics, holidays, and week-ends in contributing to the monthly record. The incidence of Easter in April is the main cause of the decrease, but a contributory factor is probably the spell of fine weather we were enjoying a few weeks ago, as March and April together show an advance of only 1.5 per cent., instead of the 2.66 per cent. obtained last year. So far this year 4,599 million kWh has been generated as against 4,374 million kWh in 1932—an increase of 225 million kWh or 5.1 per cent., which compares

with 7.6 per cent. for the first four months of last year. Possibly in this way, as well as in the falling-off in cable orders referred to last week, we are now feeling the effect of mistaken " economy " in the holding up of distribution extensions.

Power Station Sites

STRIKING confirmation of the view that suitability of site is of more importance when deciding the merits of a generating station than efficiency of plant installed is provided by the Thornhill station of the Yorkshire Electric Power Co. This station was originally built in 1905, and its retention to-day would of itself indicate foresight. But by superseding some of the old plant by a 30,000-kW unit the thermal efficiency (on kWh generated) for the past four months has been 25.64 per cent.—a figure which, we believe, has not before been obtained over so long a period in this country. The coal used has the relatively high calorific value of 11,570 B.th.U. per lb., which leaves little margin for errors in sampling. During the same four months the thermal efficiency of Ferrybridge power station was 22.28 per cent. This is close enough to its performance for 1931 (22.72 per cent.) to indicate that the results at Thornhill have not been obtained at the expense of Ferrybridge, with which it runs in parallel.

We Must Have More!

VIEWING the country as a whole, there is a deplorable lack of electricity showrooms if we consider their number in relation to the number of undertakings. It is one of the many glaring indications of the lack of enterprise for which some concerns have become notorious, but if we regard the matter from a commonplace level their absence suggests ignorance of the most elementary business - getting practice on the part of somebody or incompetence of those who, though in positions of authority, deliberately adopt a false economy policy because they deem a showroom and its staff an extravagance. Electricity is a commodity which both requires and lends itself most admirably to demonstration and display, and it is the duty of every undertaking to do something. Only in very exceptional circumstances will the effort and expenditure fail to bring its reward.

Industrial Difficulties

THE increasing difficulty of trading conditions during 1932 did not prevent London Electric Wire Company, and Smiths, Ltd., from maintaining a turnover proportionately the same as in 1931. Mr. W. J. Terry, when addressing shareholders last week, referred to the continued fall in the prices of commodities and selected as a special example electrolytic copper, which fell from £50 per ton at December, 1931, to £34 10s. a year later—a fall of £15 10s. This year a rise has been in progress and the market shows signs of improvement. The better understanding that now exists between copper producers and manufacturers has taken practical form in the establishment of the Copper Development Association. Like many other industrial companies, the London Electric Wire Co. was far from working to full manufacturing capacity, and competition for work that was going was very keen. The addition of new manufactures is not a matter to be undertaken without great care when excess productive plant exists, but the company made satisfactory progress with the development of its enamelled wire. The severe slump which affected the whole of the radio industry naturally retarded the extension of that side of the company's business. Revival of general trade is what everybody needs. Dr. Magnus MacLean alluded to the effect of the continuous fall in selling prices at the meeting of Craigpark Electric Cable Co., and to the impossibility of reducing production and other costs relatively to this fall.

B. & W.

SIR JOHN DEWRANCE, at the Babcock and Wilcox meeting, mentioned signs of revival in South Africa and India; other overseas markets were adversely affected by world conditions. At home they must expect a slowing down in boiler plant and other B. & W. products for electrical purposes until existing electricity plants were more nearly loaded. It was encouraging to hear that down to date this year the amount of new business exceeded that of the corresponding period of 1932.

CHANGE OF ADDRESS

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THE ELECTRICAL REVIEW

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DORSET HOUSE
STAMFORD STREET
LONDON, S.E.1

Telegrams: "Ageekay, Watloo, London"
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A Consumers' Tax

A MEASURE has been passed by the U.S. Senate that transfers the 3 per cent. Federal energy tax from consumers to public utility companies. The companies strongly object to the measure on the ground that it places an additional tax of about $26 million on the industry. On the surface it might appear that the question concerned only a method of collecting the tax, and that there was something to be said for leaving the companies free to decide its incidence. Possibly, however, the State Commissioners might not sanction the reimposition of the tax on the consumers by way of increased charges. Even if they did, higher charges might prove a greater deterrent to the use of electricity than would the same amount paid as a tax and recognised as such. Any tax must be bad that, by placing a restriction on the development of electricity supply, is thus likely to reduce the aggregate Government revenues. Certainly, those consumers who adopt the most up-to-date methods should not be made to feel that they are thereby penalised.

An Opportunity Seized

WE have often urged that frequency change-overs provide a splendid opportunity for the reorganisation of the driving arrangements in works to the advantage of electricity. The article in this issue by Mr. G. T. Allcock provides a practical example of an opportunity that was seized. The textile—and most other—industries can spend money at the present time only if they can be persuaded that substantial economies will accrue. Messrs. Ashton Bros. & Co., Ltd., were enabled to realise how much was to be gained by supplementing, as far as they could, the grant that had been made by the C.E.B. for the bare cost of the change-over.

A Cotton Mill Change-over. By G. T. Allcock, B.Sc.

An opportunity taken to modernise the equipment

ALTHOUGH a change-over of system forms a heavy charge on the industry, yet given enterprise and the careful co-operation of consumer, supply undertaking, and motor manufacturer it offers an opportunity for reorganisation and the more efficient use of power. Such an improvement will react to the benefit of the supply undertaking, not only by enhancing its credit and cementing friendly relations with consumers, but also by leading to increased sales. Few industries are at present fully electrified, even as regards their lighting and machine drives, and it is on the prospects of obtaining an increased industrial load to counterbalance the rapidly developing domestic load that supply undertakings largely depend for their future success.

A change-over that has been successful in improving performance is as potent an influence in attracting new business as a reduction in the price of electricity, and is probably no more costly to the supply undertaking. The extra trouble and cost involved in handling the change-over of large industrial consumers on individual lines, and in an accommodating spirit, is well justified, and a proportion of it might well be charged against advertising. The benefit of this attitude towards change-over is well illustrated by the results obtained at the works of Messrs. Ashton Bros. & Co., Ltd., cotton manufacturers, of Hyde. This firm is one of the largest in the cotton industry.

Mr. G. T. Allcock, B.Sc., A.M.Inst.C.E., A.M.I.E.E., is a member of the staff of the Manchester Corporation Electricity Department

It is through the kindness of the general manager, Mr. O. L. Jacks, that this description is published. The works at Hyde consists of five mills built and equipped at different dates, and at full capacity they employ some 3,000 to 4,000 hands. Certain recent extensions were electrically driven, but the greater part of the works was rope-driven from large mill steam engines. From time to time in the past, as engines broke down or as convenience of operation dictated, various rooms were disconnected from the engine and their load taken by motors connected to the 40-cycle mains of the Stalybridge, Hyde, Moss and Dukinfield Tramways and Electricity Board. The electrical load thus increased gradually; until, when the time came for changing over to 50-cycle supply, the works was using a total of 2,600 h.p. of motors running on purchased power, and 3,250 h.p. of steam engines. In this early electrification, group drive was adopted; much of the original line shafting was retained, and the load was divided between a relatively small number of large motors. The directors of the firm were advised that the benefits of electrification in a cotton mill could only be realised in full measure where a system of individual drives was adopted. This would have involved a heavier capital expenditure than they were prepared to face. In view of the very considerable economies that could be foreseen, however, they were prepared to supplement the allowance made by the board for the bare replacement of existing equipment in order to facilitate control and cut out a proportion of the inefficient line shafting. Increased productive capacity, improved quality of production, and reduced cost of maintenance and management have justified this extra expenditure. The considerable further electrification that has since been put in hand forms the best evidence in support of this.

Sub-stations and Distribution

As the works covers a wide area it was decided to provide a number of sub-stations taking supply from the 6,600-V mains of the Joint Board. In most cases the old engine-room of each mill has been used to house the equipment, and the sub-station at Wharf Shed Mill is typical of the rest. This consists of a two-panel cubicle-type switchboard, the busbars of which are fed through links from a looped-in 6,600-V feeder; two oil breakers each control a 500-kVA transformer. On the low-voltage side an ironclad unit-type board, manufactured by Messrs. Veritys, Ltd., consists of two 1,000-A triple-pole oil-immersed circuit breakers controlling the transformer secondaries, an instrument box, and four 500-A breakers controlling individual feeder circuits. Space has been left for a third transformer breaker and two further feeder circuits.

The works lighting board also consists of ironclad unit-type gear. It carries two 150-A triple-pole, air-break circuit breakers with ammeters in each phase. Distribution boards are situated in the works and not in the sub-station.

In the preparation departments where raw cotton is received from the warehouse, broken down from bales, cleaned and mixed, the bulk of material handled is considerable, and the machines should be laid out on production-flow lines. Individual drive permits this, since the limitations imposed by line shafting are avoided, and its adoption was accompanied by considerable re-arrangement of the machines. Taylor Lang bale openers are driven by 10-h.p. squirrel-cage motors fixed to the ceiling and driving down through long belts; these machines have a heavy starting load and the fast and loose pulleys on each machine have therefore been retained. Scutchers, which continue the cleaning and mixing process, are driven in a similar way by 3.6-h.p. squirrel-cage motors, but the fast and loose pulleys are dispensed with, and the operative starts and stops the machine by a push-button switch.

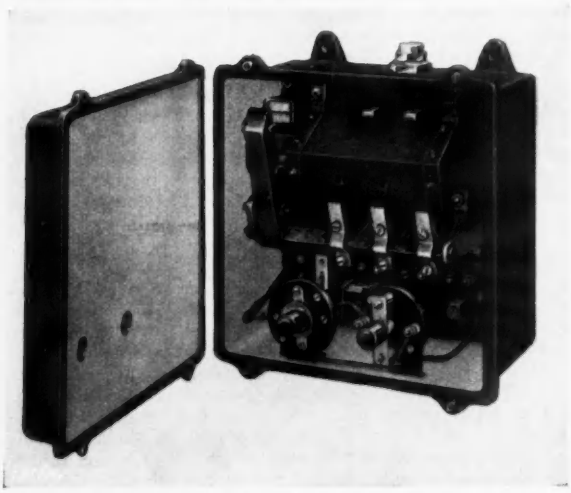
The next process of manufacture is carding, in which the cotton is combed and delivered as an untwisted rope with all the fibres lying lengthways. In a typical cardroom—that at the West Mill—the cost of individual drive was considered prohibitive and the shafting was split up into sections, each driven by a 10-h.p. motor and carrying five carding machines. The main shaft and the driving belts, which ran horizontally overhead, were taken down.

From the cards the thick rope of cotton is drawn out in drawing-slubber, intermediate, and jack frames. It is then

A night view of the weaving sheds of Messrs. Ashton's mills

spun into thread, and doubled and wound into cheeses or cops, according to the purpose for which it is required. In the winding and ring-spinning departments of the South Mill, the load was originally taken by a 100-h.p. motor placed in an old engine room at the end of the mill. Ropes from the motor pulley drove main shafts on the different floors which passed through the dividing wall and ran down the centre of each room over the machines. The frames are arranged across the rooms; a belt drive used to be taken from the main shaft over gallows pulleys down to the driving pulley at the end of each frame, but this arrangement was not working well and individual drive was adopted.

In the winding room each frame of 85 spindles was driven by a short belt from a 2-h.p. motor mounted on the floor. For



The Verity push-button starter used for motors up to 15 h.p.

spinning frames more power is required, and the necessary size of motor could not be accommodated on the floor without unduly restricting the gangways. Squirrel-cage motors of 8-h.p. running at 1,425 r.p.m. were, therefore, fixed to the ceiling joists which once carried the old gallows pulleys, and now drive each ring spinning frame of 332 spindles by a vertical belt. The motors are pipe ventilated from a common air duct fixed to the ceiling which runs the length of the room, and are controlled by push-button switches on each frame end.

As considerable alterations were made to the cotton machinery, a comparison of the consumption before and after change-over does not indicate the saving in friction losses. Periodically, each frame has to be stopped in order to replace the finished cops by new pirns. This process, which is known as "doffing," may take up to five minutes to perform, and on some classes of yarn, is carried out twenty times a day. Under the old system of drive, the frame was stopped by moving the belt to a loose pulley, and the power losses in this pulley, gallows pulley, and belt continued while the frame was idle. In the new system the motor itself is stopped. The saving is considerable, but the greatest benefit derived from the new drive in this department is the almost complete freedom from spoilage.

In the Weaving Sheds

In a typical weaving shed, such as that at Carrfield Mills, power was originally supplied from a main shaft running the length of the shed and driving cross shafts by bevel gearing. The main shaft and gears have been scrapped, but the cross shafts have been retained and extended to project through the wall into a separate motor chamber running from one end of the shed to the other. Each shaft is driven by a 20-h.p. 720-r.p.m. squirrel-cage motor driving through oil-immersed laminated gears. There are twenty-two of these equipments each controlled from an auto-transformer starter on an iron-clad board. Within the shed two rows of looms are driven by overhead belting from each shaft. Ball bearings have been fitted throughout in order to reduce friction loss.

Although only certain typical examples have been singled out for detailed description, the volume of work involved can be realised from the fact that it called for the installation of some 359 motors, ranging in size from ¼-h.p. to 120-h.p. and totalling approximately 3,000 h.p. The results obtained were so satisfactory that the directors decided to transfer a further section of the load to the Joint Board supply. In Throstle-bank Mill a 650-h.p. triple-expansion horizontal condensing steam engine was at that time used to drive 744 looms by rope and shafting, and a 500-kW, 40-cycle alternator which, in turn, supplied power for 960 looms. The plant was not in satisfactory condition and it was decided to take out the alternator and transfer its load to the public mains, thus leaving only some 300 h.p. on the engine.

In the electrically driven section the millwrighting was in good order. The system of group drive was retained, and two 120-h.p., and two 90-h.p. 40-cycle motors were replaced by similar 50-cycle machines increasing the load of the Joint Board by 420 h.p.

As conditions of load remained unchanged the results obtained from the alteration give a useful indication of the merits of purchased supply as compared with privately generated power. The rate of production from the looms was increased by 3 per cent. This is rather surprising, since the shaft speeds have not been increased and can only be explained by the steadier frequency of the public supply. There has been a reduction in the cost of coal required by the engine, though the saving is not sufficient to pay for the energy consumed from the public mains. Nevertheless the running costs of the 744 looms that are still engine-driven is nearly twice as much per loom as in the electrically driven section.

Messrs. Ashton Bros., like other great firms in the cotton industry, have suffered in the trade depression, and Middle Mill, which has not been in full production for some years, is now being re-equipped for a different class of trade. This mill used to be driven by a 650-h.p. engine, which is now scrapped. As new plant is installed it is driven by motors from the public supply; up to the present ten motors, totalling 102-h.p., have been installed, but there is no doubt that a substantial electrical load will be built up as conditions of trade justify development.

The greater part of the cost of change-over has been borne by the electrical industry through the agency of the Joint Board. Very definite compensating advantages have been received, however, in the connection of new load. It would probably be speaking too definitely to say that the increased connections are a direct result, but it is safe to say that the improved performance since change-over has focused attention on the question of electric drive, and has predisposed the directors to favour a policy of development on the lines of purchased electricity supply.

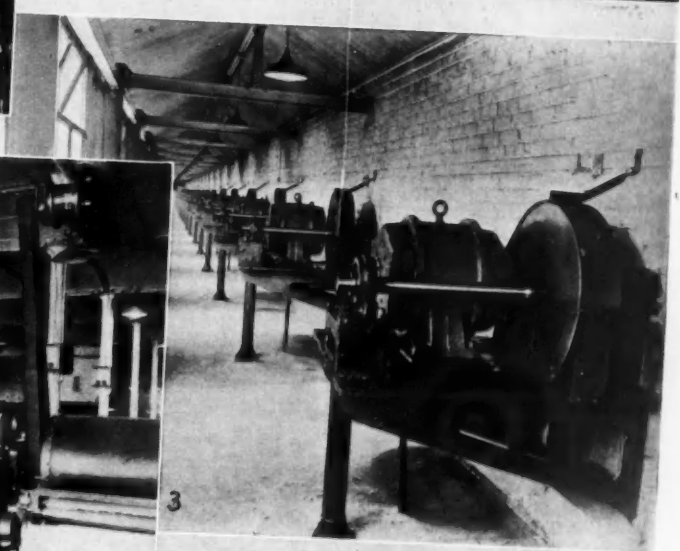
Motors and Control Gear

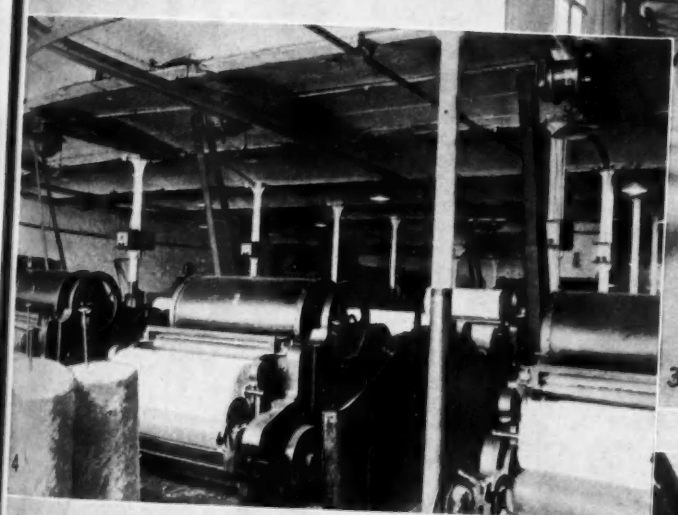
Many of the drives presented difficult starting conditions, and seemed to call for slip-ring motors. Had these been essential the cost of individual drive would have been prohibitive and the old system of group drive would have been retained. The starting current of a Verity squirrel-cage motor at full voltage is only 4½ times full-load current. In view of this characteristic and of the size of Messrs. Ashton's load, the Joint Board was prepared to accept these motors for direct connection to the mains in sizes up to 15 h.p. Since the power required by each unit of the plant was in nearly all cases less than 15 h.p., this proved to be the solution for all drives with difficult starting conditions. For these motors direct-on-line starting switches are used in which one push-button starts the motor and another stops it.

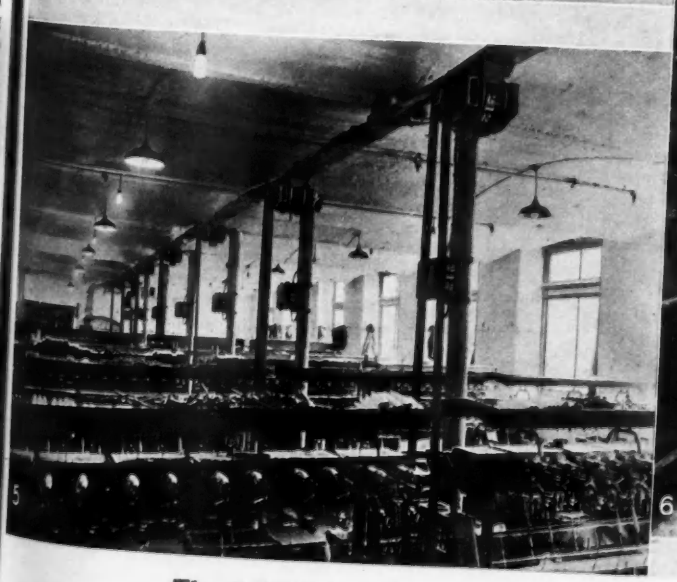
Advocates of the electric drive always stress the even speed of electric motors, as compared with the cyclic variations with engine driven machines; they maintain that higher working speeds can be adopted and greater production obtained in consequence. Six years ago, when the Carrfield weaving shed was transferred from engine to motor drive, the speed of the looms was increased by two to four picks per minute. Group drive was adopted on this section, and the pulleys were so designed that the correct loom speed was obtained when the motors were working at full load. The characteristics of the motor cause a further increase of some 2½ per cent. when only one or two looms on any given section are working. In the cotton trade many of the acknowledged figures for safe working speeds are still based on the performance of the old mill engine; these should have been raised with the advent of the electric motor.

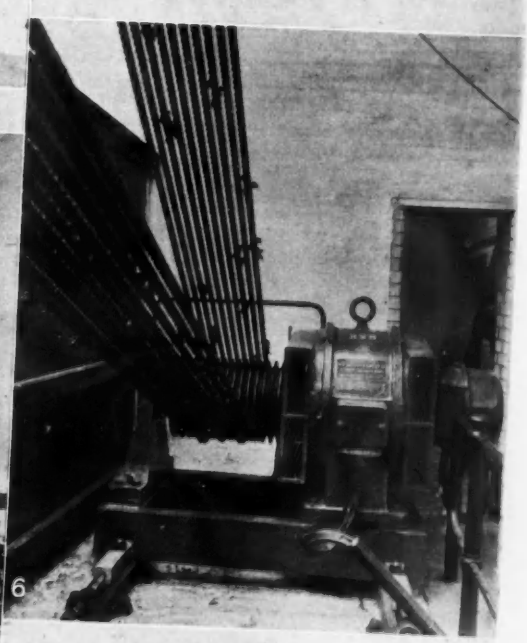
Not the least important benefit of individual drive is that it shows up minor imperfections in the equipment, and thus enables friction losses to be kept down. The work under review provided several instances of this. Although the number of power units has been increased very considerably, maintenance costs have been reduced by some 25 per cent., as compared with the group drive system, and are at least 50 per cent. less than those incurred with a drive from a single steam engine.

Change-over on the lines recommended involves far more detailed work than copying the nameplate particulars of existing motors on to the order sheet for new machines. In the case of Messrs. Ashton Bros. it involved much investigation and close co-operation between Mr. W. Brown, the firm's electrical engineer, Mr. J. Harwood Lumsden, chief engineer of the Joint Board, and Mr. A. W. Hiley, the district manager of Messrs. Veritys, Ltd., who supplied all the motors and starters used for the change-over.









The "changed-over" cotton mill described in the preceding pages

1. Motors with push-button starters driving spinning frames. 2. The old method of driving the mills—a 1,250-h.p. triple-expansion engine with a 45-ft. diameter flywheel. 3. 20-h.p. motors in the weaving shed at Carrfield Mills. 4. Scutches in the West Mill driven by 3.6 h.p., 2,850 r.p.m. motors. 5. Pirn-winding room at Carrfield Mills; frames driven by 2-h.p. motors. 6. Rope driving by a 120-h.p. motor at the Throstlebank Mill.

Transformer Oil. By John P. Murrough, B.Sc., Assoc.A.I.E.E.

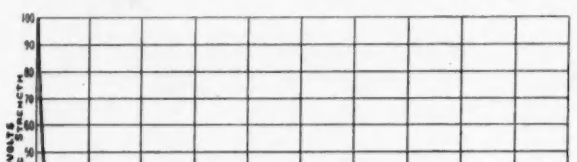
THE oil most commonly used in transformers is a mineral oil obtained by the distillation of crude petroleum and is usually made up in two grades—medium and light. These oils have the following characteristics :—

	Medium.	Light.
Flash point	180° C. to 190° C.	130° C. to 140° C.
Burning point ...	205° C. to 215° C.	140° C. to 150° C.
Freezing point ...	−10° C. to −15° C.	−15° C. to −20° C.
Density at 13.5° C. ...	0.855 to 0.870	0.845 to 0.850
Viscosity at 40° C. ...	100 to 110 sec.	40 to 50 sec.
Acid, sulphur, alkali, moisture	none	none

The light grade is mostly used with water-cooled or combination self- and water-cooled transformers where the guaranteed normal load temperature rise is less than 50 deg. C. The medium grade of oil is usually supplied with self-cooled transformers and where the temperature rise is 50 deg. C. and higher. Transformers operating outdoors under very severe winter conditions are often filled with an oil having a freezing temperature of 30 deg. C. The heat due to losses on load is carried away by convection currents in the oil to the tank which in turn radiates it to the surrounding atmosphere.

Since the two main functions of transformer oil are (1) to add insulation to the windings, and (2) to dissipate heat, it should be a good insulator and possess good thermal conductivity, high specific heat, high co-efficient of expansion, and low viscosity. It must be capable of withstanding the operating temperatures without carbonising, or producing gummy deposits on the coil surfaces; and it must be stable, difficult to ignite, and free from acids or other ingredients that will attack fibrous materials, iron, copper, or varnishes.

When oil is heated to a temperature a little below that of the burning temperature it commences to give off a steam-like vapour originating on the surface, which will ignite in a series of little flashes if a naked flame is applied; this is



The effect of moisture on dielectric strength

known as the flash point, since at this stage the oil itself does not support combustion. As a rule the flash point and viscosity of an oil vary together, *i.e.*, an oil having a high flash point will probably be high in viscosity. The burning point is that temperature at which the vapour and oil will support combustion and will burn continuously when ignited. To reduce fire hazard to a minimum transformer oil should have comparatively high flash and burning temperatures, but at the same time the viscosity must be as low as possible to permit free circulation.

The freezing temperature is the lowest temperature at which the oil will pour or flow when it is chilled without disturbance under definite conditions. Where a transformer is situated out of doors in low temperatures and oil is solidified in the cooling ducts the coils might reach dangerous temperatures as with small transformers operating at no-load where the core loss is insufficient to keep the oil liquid. The viscosity of an oil is its relative stickiness, and is determined as the time in seconds required for a known quantity of oil, at a definite temperature, to flow through a standard orifice.

The Effects of Moisture

Moisture of only 0.06 per cent. reduces the insulating value by about 50 per cent.; the amount that may be held in oil depends on the characteristics of the oil itself. Moisture will tend to sink, but some will remain suspended as an emulsion; with good oil this will be a very small proportion.

Oil drums should be stored in a closed room at an even temperature. If they must be stored out of doors they should be protected from the weather. On no account should they be stood on end, as in this position water will collect around the bung and no matter how tight it may be there is always the danger of moisture entering the drum; bungs should be inspected periodically and all loose ones tightened. The drums should be stored at an angle of 45 deg. to eliminate the possibility of moisture collecting around the bung. A small pump should be used for drawing off small quantities of oil, and the drums should never be opened up out of doors unless the weather is dry.

It is of the utmost importance that the oil containers should contain no moisture or other foreign matter. A drum, when it is first opened, will usually make a hissing sound; if it does not either the bung was loose or else the oil has remained at the same temperature as when the drum was filled; a sample of the oil should be tested before draining off. Scale may be present in the oil, since transportation will tend to loosen small particles on the inner side of the drum, but this can be easily removed by filtering.

Sampling and Testing

When taking samples the oil should always be drawn from the bottom of a transformer, since moisture being heavier than oil will tend to settle to the bottom of the tank, reducing the dielectric strength. If the sample is being taken from an oil drum, one should use a glass tube about 36 in. long and about ½ in. in diameter, which has been previously treated for moisture, place the thumb tightly over one end and insert the tube in the drum; then remove the thumb to allow the air to escape, replace the thumb and withdraw the tube with the sample of oil. During sampling and testing extreme care should be taken to avoid any contact between the sample and the hands because of the danger of absorbing perspiration, the slightest amount of which will break down the sample.

The following points are very important: The drum should be allowed to stand for several hours before taking a sample; samples should be taken from the bottom; rubber hose should never be used; sampling tubes and sample containers (which are preferably of glass) should be clean and free from moisture; cold samples should never be taken into a warm room for test, since moisture will condense and be absorbed by the oil.

The electrical or dielectric-strength test is by far the most satisfactory method of determining the condition of an insulating oil. The dielectric strength is determined by passing a high voltage between two electrodes contained in an insulated cup in which the sample is placed. The condition of an oil can be ascertained quickly and graded according to the accompanying table which is based on a time limit of five seconds to each range of voltage with 1-in. diameter disc electrodes set 0.1 in. apart.

Stands kV.	Breaks at	Grade of Oil.
25.0	—	Excellent
22.5	25.0	Good
20.0	22.5	Satisfactory
16.5	20.0	Doubtful
—	16.5	Unsatisfactory

It should be ensured that the test cup is warm and dry and contains no foreign matter and that the gap is set accurately. The sample should be allowed to settle in the cup for about three minutes to let air bubbles escape before applying the test current. A proportional correction should be made in breakdown voltage for any variation in the primary voltage from that for which the test set was designed, and at least three tests of each sample should be made.

A Chemical Method of Testing

The insulating property may also be determined by the "anhydrous copper-sulphate test." This chemical is prepared by heating copper sulphate (blue vitriol) in a pan to drive out the water of crystallisation, leaving a white powder. A medium-sized test tube, which has been treated previously for moisture, is filled with a sample of oil (which must not come into contact with anything that would tend to add moisture or other matter likely to break down the dielectric value); a small quantity of the white powder is added and the mixture is well shaken. A dry cork (not rubber) should be used to plug the top of the test tube, since perspiration from the thumb or finger if placed over the top would ruin the test. Moisture will combine with the anhydrous copper sulphate and form a blue solution, the depth of colour depending on its amount.

The length of time that an oil can be used continuously depends largely on the thoroughness with which it is protected from moisture, and, where heavy oils are used, the temperature at which the transformers are operated. Normally, oil in a high voltage transformer should be reliable for about eighteen months to two years. A good practice is to test all oil in power transformers at least every eighteen months, and, if it is found unsatisfactory, filter it without delay. If careful check is kept on the condition of the oil and filtering is carried out when necessary it does not matter which programme is followed.

Generally a temperature of between 50 deg. C. and 60 deg. C. should be used when filtering oils that have broken down under test voltages varying between 20 and 22 kV. Oil containing carbon sludge formed by arcing below oil level and with a breakdown test of less than 20 kV should be heated to about 75 deg. C., and the water seal method used for filtering.

Some Driving Forces in the Industry

Carron Company

1. Mr. John A. Fraser, commercial manager, Heating and Cooking Department (domestic). 2. Mr. John George, manager, Cooking Apparatus Department (heavy section). 3. Mr. Malcolm Roughead, works manager, Electric Cooking and Heating Department (domestic). 4. Mr. George Pate, O.B.E., J.P., manager of the company. 5. Mr. James R. Laird, Assoc. I.E.E., superintending electrical engineer

Glasshouse Horticulture. By E. S. Shoults

IN the areas devoted to glasshouse horticulture, the holdings are much smaller and are closer together than is usual for rural consumers. There is also a tendency for the industry to develop in certain well-defined districts. This concentration would seem to offer great advantages for the spread of electrification, but progress has been very slow, for reasons that are mainly financial.

Glasshouse horticulture is carried on in three main districts, the Lea Valley, Worthing, and the Channel Islands. In none of these areas is electricity used for this purpose to any great extent, as compared with Holland in a similar area devoted to glasshouses. The area of glass in the Lea Valley is estimated at 1,500 acres, the capital involved being of the order of four million pounds, with an annual labour bill of about £750,000. Worthing and the Channel Islands will more than double these figures, so that the industry is of considerable importance, and offers a great potential field for electrical enterprise.

Lighting and Pumping

The purposes to which electric power can be applied, without further experiment and investigation, are limited to the driving of motors and a very small lighting load. For the production of crops such as tomatoes and cucumbers a plentiful supply of water is essential, and with a few exceptions it is obtained from private wells. A fair estimate of the power required for this purpose would be about 2 h.p. per acre, and the load would be on for about six hours per day for six months in the year. For the 1,500 acres in the Lea Valley, the possible load is thus 3,000 h.p. for 1,100 hours, roughly 3,000,000 kWh per annum for water alone. From the best information obtainable it appears that the actual consumption does not exceed 15 per cent. of the possible, and this includes the load for other purposes than water raising.

The slow progress of electricity is due largely to the industry having grown up before a supply was available, and nurserymen cannot face the cost of the change-over from other sources of power. The capital costs per acre of glass are very high, and growers, finding themselves able to get along with what they have, prefer to spend any further money in new glass. Many nurseries are situated at some distance from a public road, and consequently the cost of the mains is very heavy in relation to the possible advantages accruing to the grower on the one hand and the supply undertaking on the other. This initial difficulty stands in the way of progress; once the supply is available not only will the grower become aware of the advantages of electricity for the work but he will discover new uses for it.

Already motors are being used for improving the circulation of the hot-water system; in many instances the ordinary gravity system is quite inadequate, the sluggish circulation giving rise to unequal heating in the houses. Apart from this, growers are trying out other systems of firing their boilers. Oil fuel is being used, and trials are being made with the use of forced draught; here again progress would be more rapid if the power were available.

The possibilities of electricity as an aid to glasshouse culture open up a large field, and experimental work is being carried out, here and on the Continent, in the stimulation of crops by heating the soil, and the provision of artificial light. Large increases in crop yields have been obtained at the Research Station at Cheshunt by raising the temperature of the soil, especially in the early stages of the growth of both tomato and cucumber plants. In the ordinary way the soil in glasshouses is warmed by raising the air temperature through the medium of hot water pipes, and such sunshine as may occur. It takes many days to warm the ground to a depth of twelve inches, and if the weather is cold growth is often seriously retarded, and the crop is delayed and reduced. Electricity offers a means of soil heating which is quite practicable in application, but it has yet to be determined whether it will be remunerative.

Three methods of applying the heat are being tried out at Cheshunt:—1. By insulated cables laid direct in the soil, and connected direct to the mains. 2. By bare wire (galvanised iron is used) laid in the soil and supplied through a transformer. 3. By the passing of the current through the soil itself, suitable electrodes being laid in the soil and supplied from a transformer.

Electricity to Supplement Existing Systems

It does not seem likely that the method of application can affect the result; it has to be determined which is the most economical. This plan of warming the soil has been used for many years; it is the foundation of the system known as French gardening, where stable manure supplies the bottom heat. In cucumber growing hot water pipes are placed under the beds; but the electrical method permits easier application and control. For general heating it seems unlikely that electricity will be a commercial proposition, except for very valuable crops requiring an accurately controlled temperature. There does, however, seem to be a possibility that electrical heating might be used to supplement hot water or steam. Electric radiators, controlled by thermostats, might be used to deal with sudden falls in temperature, arising from outside conditions, or the partial failure of the hot water system.

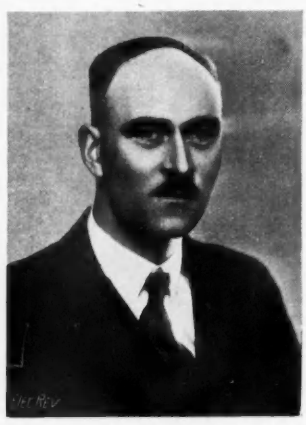
The use of artificial light to stimulate growth has also been tried with some success, especially for shortening the time for bringing flowering plants to perfection. Here again a technique needs to be developed; the best type of lamp has to be found, and the best position for it in relation to the plants. One difficulty that has been encountered is the effect of the heat from the lamps which engenders too-rapid growth.

Experimental work with new methods and ideas is also being delayed owing to the fact that very few growers know anything of the possibilities of electricity, and finding themselves able to get along without it are not interested.

The Nearly All-electric House. By E. T. Barton

THE value of all-electric houses is not disputed, for they have assisted thousands of people to appreciate the advantages of electricity for all domestic purposes. They provide an effective means of demonstration and exhibition, but it is doubtful if they make a strong appeal to prospective house buyers to have in their new homes as many electrical facilities as they can afford.

The initial outlay and running costs of all-electric equipment is beyond the means of the average family, so that while many of the older houses are discarding antiquated methods in favour of electricity, countless new houses are being erected whose installation consists merely of a few lighting points. Some of them will be supplemented after completion by a few heating plugs; perhaps a cooker will be added, and in some cases an immersion heater will be fitted into the hot water cistern. These labour-saving devices vastly improve a house, but do not make it as good, as convenient, or as economical as if it had been designed for the use of electricity: designed not as an all-electric house but as one in which the advantages of electricity can be obtained to the fullest extent of one's appreciation and means.



Mr. E. T. Barton

There is no need to lose sight of our ideal of the all-electric house, nor must we relax our efforts to improve existing houses by the addition of current-consuming devices, but it is evident that we must also endeavour to prevent the perpetuation of those conditions under which it becomes necessary to improve modern houses. For that perpetuation, at present so marked in the majority of housing estates, we cannot put all the blame upon the builder, for he is building and will continue to build the houses that his clients want. Our business is to educate and encourage the prospective buyer to want and demand the kind of house in which electricity will provide the maximum value in service for the minimum expense in outlay and running costs. The demand for such houses can be cultivated wherever electricity is sold at less than one penny per kWh for domestic purposes.

One Coal Fire

In advocating the nearly all-electric house it is suggested that this will meet the requirements of all who can afford to buy houses of their own; and it can be constructed without drastic departure from conventional design in house building. In fact, externally, its appearance is the same as the average modern villa, unless it is observed that the number of chimney pots has been reduced because only one smoke flue is provided —from the open coal fire-place in the living room. The preference for a coal fire dies very hard, especially amongst English people, and we do well to submit to it in this one room, which needs to be warmed continuously throughout the day for eight or nine months of the year; and there is no cheaper way of doing this than by means of a coal fire in a modern grate. During the other three or four months when occasional heating is required there will be every incentive to use an electric fire.

In addition to warming the room, the coal fire can provide hot water for baths and domestic use, but the system should be arranged so that when it is not convenient or expedient to have a coal fire electricity will be brought into commission to solve the hot-water problem. This can be done either by fitting an immersion heater in the ordinary cylinder or by using a self-contained electric cistern modified to allow for fire-back boiler feed. The kitchen will have an electric cooker, and if a good one can be hired from the supply authority no outlay will be involved. A light-duty plug provided for the alternate use of kettle and iron will also accommodate an electric washer. For the wash-boiler, which many housewives consider essential, a heavy-duty plug will be fitted.

With the exception of the kitchen and bathroom, each room in the house will have a heavy-duty plug for an electric fire, but the number and style of fires in actual use will depend upon the tastes and means of the occupiers. Some people will manage quite well with one radiant fire normally situated in the lounge and carried as required into the living room or any of the bedrooms. Other families will prefer to have a more ornamental or artistic fire in the lounge, perhaps of the imitation coal variety, with a number of portable fires for the other rooms.

Economy and Convenience

The saving in building costs due to the elimination of flues, fireplaces, combination range and gas piping will at least cover the cost of the essential electrical equipment, making the nearly-all-electric house as cheap as its predecessor, and considerably cheaper than a patched-up modern house. Running costs will vary according to the habits of the family and the use made of electricity in combination with coal, but it needs little imagination to show that the average householder can run such a house as economically as he desires, while obtaining the best value from the use of electricity in cleanliness, convenience, and utility, with first-rate cooking and an abundant and continuous supply of hot water.

One of the principal advantages of this house is its adaptability to the needs and preferences of those who live in it. Although its essential electrical equipment is meagre, there is practically no limit to the number of labour-saving and luxury appliances that can be introduced and used without alteration to the wiring. With the growing popularity of such houses the demand for supply from residential mains will increase steadily, and electricity should become cheaper. If in the course of progress its price becomes low enough, and the standard of living high enough to justify it, the change-over to all-electric working would be an easy step. Meanwhile, the best interests both of the electrical industry and of the community can be served by advocating and encouraging the nearly-all-electric house.

Radio Interference

A CONFERENCE of representatives of about a dozen international organisations, either directly or indirectly interested in the avoidance of interference with broadcast reception, will be held in Paris on June 22nd and 23rd under the auspices of the International Electrotechnical Commission, and will be presided over by Dr. Enström (Sweden), president. The date has been chosen to coincide with the seventh meeting of the Paris High Tension Conference.

The increasing use of electricity for so many domestic and industrial purposes is likely seriously to increase interference with radio reception, unless definite preventive measures are taken. When it is realised that in this country there are about twenty million regular listeners, the importance of the problem will be appreciated. The Post and Telegraph Administrations in many countries have found it necessary to exercise their statutory rights to impose regulations for their own protection. Manufacturers of electrical plant and appliances are being called upon to give guarantees for the avoidance of interference, a subject regarding which there is not sufficient data to enable them to give such guarantees.

Therefore the electrical industry as a whole is deeply concerned in finding a solution. International trade, implying the movement of electrical apparatus from one country to another, makes it essential that international agreement should be arrived at in order that legislation in the various countries shall lead to fairly common practice, and so prevent import restrictions due to non-compliance with local regulations.

The Institution of Electrical Engineers has decided to set up a comprehensive Committee to co-ordinate existing efforts, and the International Electrotechnical Commission has been urged to convene a conference in order to endeavour to ascertain the best means of bringing about the fullest co-operation between all those interested bodies which have been investigating the subject from their own particular angles. The conference will consider the setting up of a joint committee composed of the representatives of the international organisations interested, the ultimate object being to draft recommendations for the assistance of the national efforts to bring about, either voluntarily or by legislation, a substantial measure of freedom from interference with broadcast reception.

One of the first matters to be discussed would appear to be a full classification of all the possible sources of interference both inherent to the receiving apparatus and due to external sources, and the question of remedial or preventive methods may then be referred, in the first instance, to one or other of the organisations directly concerned with a particular class of interference. The conference will be attended by representatives of the British National Committee of the I.E.C. (*i.e.*, the Electrical Industry Committee of the British Standards Institution) which is in close liaison in this matter with the Institution of Electrical Engineers. As soon as any recommendations have been agreed upon, they will be brought to the attention of the B.S.I. and the I.E.E., and through them to the various national organisations connected with those bodies.

Electricity in Gasworks. By C. H. S. Tupholme

The wisdom of our rivals

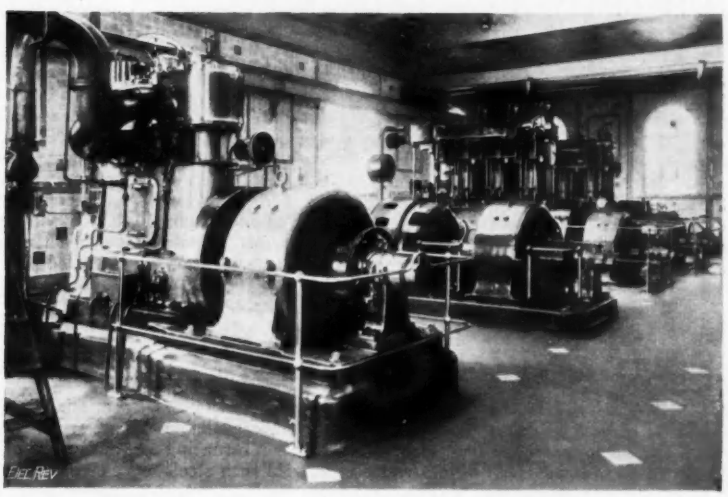
"IT is hardly necessary to state that electrical energy provides the most efficient transmission system yet available," said no less an authority than Mr. F. M. Birks, O.B.E., at the last annual meeting of the Institution of Gas Engineers. Though Mr. Birks is mechanical engineer to the largest gas undertaking in the world, the Gas Light and Coke Co., there are many gas engineers who would regard such a statement as rank heresy. Fortunately such an attitude is fast dying out among the more progressive gas engineers, who believe in employing the most efficient agent at their command for any particular purpose, with the ultimate object, of course, of improving the all-round efficiency of the carbonisation process. Gasworks and their allied by-product plant impose conditions upon electrical apparatus as severe as those in any other industry. Electrical plant is used for coal handling and breaking, retort charging, and discharging machinery, pumps of all kinds, particularly those used for tar, iron-oxide handling plant, gas washing machinery, and coke conveying, cutting, and screening. All of these operations are arduous, and the motors and control gear are exposed to dusty and corrosive atmospheres, to the weather, or to splashing by tarry substances. They must, therefore, be adequately protected. Another advantage is "foolproofness" of the entire electrical plant, while robust construction is essential, so that the plant will function for long periods with the minimum of attention.

Large Plants

While the majority of gasworks prefer to generate their own power and use the public supply as a standby, there are others where the reverse is the case. Such an example is the Hull station of the British Gas Light Co., Ltd., which sells about 2,000 million cu. ft. of gas per year to 60,000 consumers. According to Mr. Harold E. Copp, M.Inst.C.E. (*Gas Engineer*, xlix, 4, 189) careful inquiry into the comparative costs of steam, oil, and gas engine generating sets compared with bulk supply from the local electricity undertaking revealed the fact that it was not possible to maintain a load factor which would enable the gasworks generating plant to produce electricity at a cost comparable with the favourable quotation for bulk supply, which was less than 1d. per kWh. For some time now, therefore, electricity has been supplied to the Hull works at 440 V d.c. The gas engine generating sets remain as standby and are run for one hour each per week to ensure that they are available for use.

While many works still employ the gas engine for generating electricity, steam is coming into more general use. The chief reason for this is the more efficient recovery of surplus, mistakenly called "waste," heat from the carbonising plant, which is used in boilers for generating steam. In those works where the dry coke cooling system is used, the sensible heat of the red hot coke pushed from the retorts is employed for steam generation, some works supplying the entire steam needs from this one source.

The largest gasworks in the world, that at Beckton, employs three turbo-alternators of 850, 1,500 and 2,000 kW capacity. The first two generate at 440 V and the third at 6,600 V. They are interconnected by transformers, the greater part of the transmission being at the higher voltage. In addition, three synchronous motor-generators are used to supply the original generating houses, which are now sub-stations, the original plant being kept for use in emergency. The motor-generators also serve the purpose of correcting the power factor, and are so arranged that they can run with enough leading characteristic to permit the power factor at the station to be maintained at about 0.9 lagging.



Electrical plant at the Edinburgh Corporation's Granton works

On a typical day's run at Beckton 28,860 kWh is metered, the maximum and minimum loads being 1,950 and 656 kW respectively. Describing this station at the annual meeting of the Institution of Gas Engineers, Mr. Birks remarked that the circulating and condensate pump motors are connected directly to the main alternator to ensure that there is no loss of vacuum in the event of the main circuit breakers coming into action. For this reason the output of the machine is metered as the net quantity available for works use and does not include the consumption of the auxiliaries.

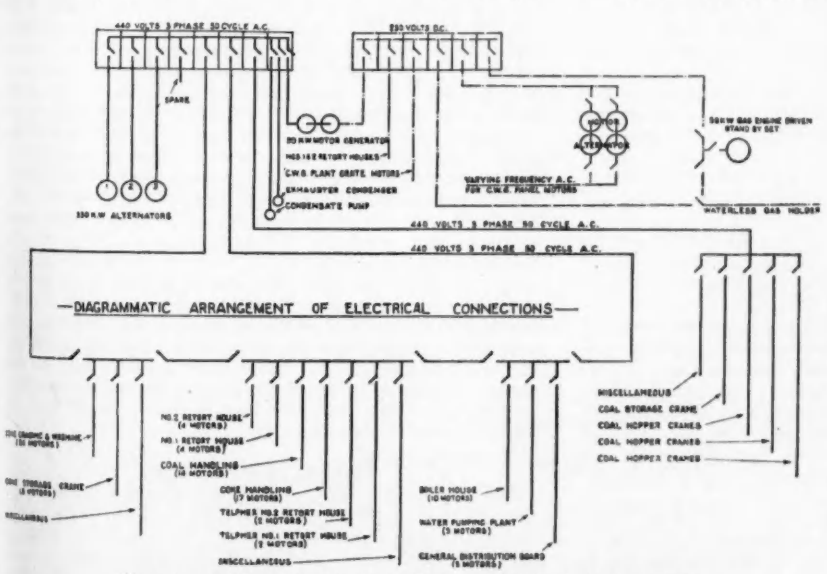

440 VOLTS 3 PHASE 50 CYCLE A.C.
220 VOLTS D.C.
SPARE
350 K.W. ALTERNATORS
50 K.W. MOTOR GENERATOR
C.W.G. PLANT GRATE MOTORS
EXHAUSTER CONDENSER
CONDENSATE PUMP
VARYING FREQUENCY A.C. FOR C.W.G. PANEL MOTORS
500 K.W. GAS ENGINE DRIVEN STAND BY SET
WATERLESS GAS HOLDER
440 VOLTS 3 PHASE 50 CYCLE A.C.
440 VOLTS 3 PHASE 50 CYCLE A.C.
DIAGRAMMATIC ARRANGEMENT OF ELECTRICAL CONNECTIONS
MISCELLANEOUS
COAL STORAGE CRANE
COAL HOPPER CRANES
COAL HOPPER CRANES
COAL HOPPER CRANES
NO. 2 RETORT HOUSE (4 MOTORS)
NO. 1 RETORT HOUSE (4 MOTORS)
COAL HANDLING (10 MOTORS)
COKE HANDLING (7 MOTORS)
TELPHER NO. 2 RETORT HOUSE (2 MOTORS)
TELPHER NO. 1 RETORT HOUSE (2 MOTORS)
MISCELLANEOUS
BOILER HOUSE (10 MOTORS)
WATER PUMPING PLANT (5 MOTORS)
GENERAL DISTRIBUTION BOARD (5 MOTORS)

Diagram of the electrical connections at the Brentford gasworks

At a Smaller Works

The plant at the Brentford works of the Gas Light and Coke Co. consists of three 350-kW turbo-alternators, one 50-kW motor-generator, and two variable-frequency alternators. According to Mr. Birks the turbo-alternators are arranged with the steam condensers integral with the turbines. The machines are designed for an overload of 25 per cent. and generate three-phase a.c. at 440 V, 50 cycles, with a power factor of 0.7. The motor generator is used to supply d.c. at 220 V for the producer telpher, the overhead trolley equipment of which could not be conveniently protected so as to allow the use of a.c. at the higher voltage, and also for the variable-speed grate motors of the water-gas plant and certain other minor services. It is duplicated by a gas engine driven generator of similar capacity, situated in proximity to the waterless holder, which is fitted with d.c. motors to drive the pumps, the company's practice being to arrange two supplies for this purpose, each supply being independent in every respect.

The two small motor-alternators are driven by variable-

speed d.c. motors and generate at 220 V three-phase. The output is used to operate special motors for driving the automatic gear of the water-gas plants. These motors are designed to keep in synchronism with the alternator so that any variation in speed of this machine is reflected in a corresponding and exactly similar degree in each water-gas set. The diagram of the electrical connections at Brentford is reproduced from a paper by Mr. Birks published in the *Transactions* of the Institution of Gas Engineers.

The Edinburgh and Burnley Works

At the Granton gasworks of the Edinburgh Corporation electricity is generated by three 90-kW Bruce Peebles sets of the open type with compound windings and operating in parallel. One is driven by a Browett & Lindley steam engine of 135 h.p. at 500 r.p.m. The other two are driven by National gas engines, each of 135 h.p. at 375 r.p.m. The town electricity supply is used as a standby, a 200-kW Peebles-la Cour convertor being installed to deal with the supply which comes in at three-phase, 50 cycles, 6,600 volts.

According to Mr. H. H. Gracie, M.Inst.Gas.E., engineer and manager of the Edinburgh Corporation Gas Department (*Gas Eng.*, xlix., 6,286), a year's working shows that a total of 525,668 kWh was used in the works. This does not include the loss in converting the town supply from a.c. to d.c., which amounts to 10-12 per cent. Of the total used, approximately 70 per cent. was generated in the works in the proportion of 43 and 27 per cent. by the steam and gas engine plant, respectively, the remaining 30 per cent. being supplied by the Corporation Electricity Department.

The cost of generation, including attendants' wages, but omitting capital charges, was 0.175d. per kWh for steam, and 0.667d. for gas. The town supply, *i.e.*, through the convertor, including attendants' wages, but again omitting capital charges, has amounted to 0.929d. per kWh, including conversion losses. The total average cost of all the supplies works out at 0.533d. per kWh, including labour; omitting this factor, the cost is 0.35d. The total cost amounts to 0.0828d. per 1,000 cu. ft. of gas, or 0.0165d. per therm.

At Burnley Corporation gasworks, Oswald Street, one of the most recent in the country, two Mather & Platt open type compound-wound interpole generators are used. These units, driven by Ashworth & Parker two-crank compound engines at 400 r.p.m., are capable of developing 100 kW at 440 V, d.c. Each generator is fitted with static balancers for dealing with 25 per cent. out-of-balance current for lighting and odd services, and on full test gave 92.8 per cent. efficiency.

These examples show that there is a market in most gasworks for up-to-date and efficient electrical plant. If a gas engineer can be convinced that he can buy power more cheaply than he can generate it in his own works, he will use the mains as his chief source, but no gas engineer will depend entirely upon the public supply and he will always insist upon his own standby plant to meet any emergencies. The increasing adoption of vertical retort installations will involve an increasing use of electricity in gasworks. Other factors which will tend to a greater use of electricity are the gradual replacement of steam-driven machinery in favour of electrically operated plant, and the adoption of more up-to-date means for handling coal and coke.

Welding Stainless Steel. By D. S. Black

THE chief characteristic of stainless steel is its resistance to corrosion. Many varieties have been made available by alloying, which reduces the necessity for furnacing and hardens the metal. Before attempting to weld such steels careful consideration must be given their compositions, the type of welding to be employed, the shape of the job, and the service expected of it, since a particular welding technique which would suit one specimen might be quite unsuited to another.

When high mechanical stress, or severe chemical conditions, have to be withstood, annealing or normalising is essential. Many welding failures can be traced to rough handling of the material. "Cold welding" should be kept to a minimum, as also should such "cold working" as flanging, rolling, spinning, caulking, and hammering. Some engineers advise hammering to toughen the metal, but this often causes internal stresses and cracks.

The Reducttion of "Weld Decay"

Temperature gradient is the cause of possible breakage near the weld, though the weld itself may remain intact. The weld temperature is about 3,500 deg. C. Parallel to, and on each side of, the weld a weak zone may occur due to the formation of a coarse granular structure of the metal, the critical temperature being about 800 deg. C. To reduce this "weld decay" the steel is normalised; some makers reduce the carbon content to the minimum, while others consider it better to use alloys.

The chromium content, the one essential of stainless steels, may vary from 7 to 40 per cent. The martensitic group is generally used for cutlery and decorative purposes, can be hardened by heat treatment, contains from 12 to 14 per cent. chromium, and has poor mechanical properties. The austenitic group ("Staybrite," "Weldanka," &c.) cannot be hardened by heat treatment, is most suitable for welding, has an expansion coefficient 50 per cent. greater than m.s., and is non-magnetic, but any rough "cold working" tends to increase its magnetic properties. If service conditions are severe, it is only necessary nowadays to furnace at 950-980 deg. C. The ordinary smithy fire is not conducive to good results, for the metal on one side of the job might be burnt, and on the other be at little above air temperaure.

To counteract the effect of "weld decay" a method which has often been successful is to clamp metal strips (preferably copper) to conduct the heat away from this area. This seems to spread the bad effect and minimise its danger. With many varieties of this steel there is a sort of time lag in the alteration of the metal structure due to the alloying.

Forge welding is impossible, as chromium and nickel oxides form before fusion. Resistance (spot) welding can be satisfactory if conditions are carefully studied and close temperature control is obtained. Up-to-date machines have automatic cut-outs, and these must be carefully adjusted. For "perfect" welding the atomic-hydrogen process is best, as oxides cannot form inside the hydrogen envelope. The "heat input" is considered to be greater than with oxy-acetylene or electric-arc welding, but seldom does one find a welder who will take advantage of the welding speed possible with this process. For plates over ⅛ in. thick, from the chemical and mechanical points of view, less trouble is experienced with expert electric-arc welding than with expert acetylene welding. Torch welding means greater "heat input" and difficulty in controlling expansion and contraction.

In acetylene welding too much oxygen produces chromium-oxide, and too much acetylene (too carbonaceous a flame) allows the molten metal to absorb carbon. Attempts have been made to automatically control flame neutrality, apparently without success. It is certain that when a welder has developed the correct technique, the welding of stainless steel can be quite satisfactory.

The speed of arc-welding is helpful. Since there is a time lag in the alteration of the granular structure, heat is localised and there is less warping; d.c. is generally considered to be better than a.c. It is, but only because of better control of the supply. Generally, several welders use one a.c. transformer, but for d.c. single-operator motor-generator sets are usually employed. When using d.c. the work is generally made positive (to give it more heat), but in stainless steel welding this polarity is often reversed. Electrodes made specially for the particular compositions of steel are used. They are of the usual type, wound with blue or white asbestos yarn (iron or magnesium silicate) and bonded with a paste of dioxidising agents. In welding chromium is lost and the rods will have about a 5 per cent. chromium excess and a 1 per cent. nickel excess.

For better "heat control" a short arc should be used (a long arc blows about) and the current should be as for the same thickness of mild steel. The welding together of plates of unequal thickness should be avoided where possible. In butt jointing a space should be left between the plates, and two or three light runs are preferable to one big wide one; the slag should be removed between each run and the last run should be brought above the plate level so that when ground flush the imperfections will be taken out.

Pickling and Cleaning

The correct electrode must be used to avoid burning-in at the edge of the weld and the formation of spongy metal, which leaves blow-holes and pits. These are a possible source of electrolytic action and endanger the life of the vessel.

In chipping, grinding, buffing, and in shot or sand-blasting care must be taken not to impregnate the metal. These abrasive methods are being superseded by pickling, and no ferrous metals are used in polishing. To remove scale a 5 per cent. sulphuric bath should be used and a 5 per cent. nitric solution for cleaning. Care must be taken to keep the acid baths up to strength as the steam for heating dilutes the solution. After pickling a hot alkali bath is necessary. Then the work must be removed from the pickling shed and not be exposed to splashings and acid vapours.

Switchgear for Swansea

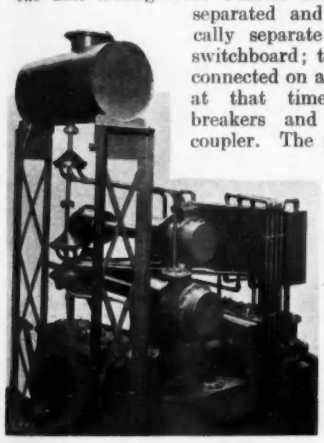
THE first section of the main switchboard for the Tir John power station of the Swansea Corporation, of which the foundation stone is being laid to-day, is in course of manufacture by Ferguson, Pailin, Ltd., Manchester. This portion controls the Central Electricity Board's transformers and feeders to Llanelly and Neath.

This 750,000-kVA 33-kV switchgear is metal-clad and completely oil filled, fitted with conservators and arranged for remote electrical operation from vertical control panels fitted with a mimic diagram and semaphore indicators for the circuit breakers and busbar selection. The units are of the double-breaker type on which busbar selection may be effected by the circuit-breaker transfer method, using one breaker only per unit; or, alternatively, busbar selection can be effected "on load" by means of a second circuit-breaker on the unit. Each unit may, in the alternative case, have two circuit-breakers, or one or more spare breakers may be provided for use during busbar coupling or busbar selection operations.

The breakers have round tanks and cross-jet explosion pots, and are arranged for vertical isolation by motor-operated screw lifting mechanism, which is also the means of lowering the tanks.

A transportation device and turntable, which permits of movement through 180 deg., enables a circuit-breaker to be transferred along a centre corridor through the units from a position on one set of bars to a position on another unit on the other set of busbars by a short journey involving simple and speedy operations.

The unit arrangement enables the busbars to be widely separated and physically and electrically separate throughout the entire switchboard; they are only electrically connected on a particular unit which is at that time equipped with two breakers and utilised as a busbar coupler. The main conductors on the unit involve the minimum loop formation. The instrument transformer chambers and cable sealing boxes can be arranged at the front or back of the unit to suit incoming or outgoing cables.

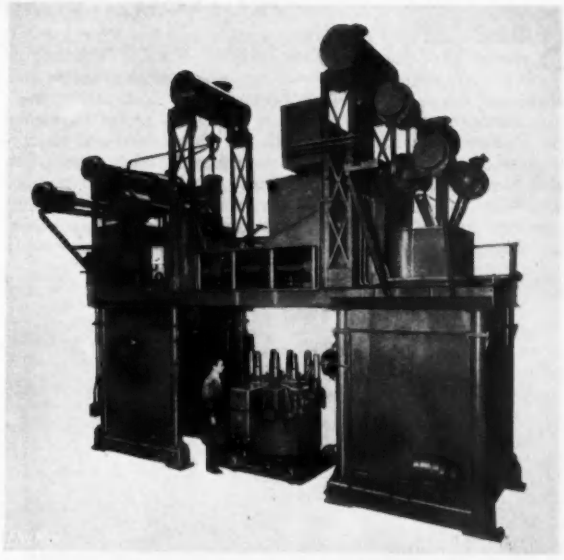


A section of the oil-filled chambers

The Oil System

All busbar chambers, instrument transformer chambers, and connection chambers are oil filled, the oil-filled portion of each unit consisting of two separate systems each including one set of three-phase busbars and an oil conservator. Each system is arranged with an oil feed from the conservator to the chambers and busbar on each phase, and valves are provided so that the oil can be drained from any one phase. Individual pipes are run from each busbar and chamber to a common header from which a single pipe is taken to the conservator vessel. Each of the chambers is provided with a relief valve and is designed so that all air can escape freely from the relief valve or through the oil feed pipes into the conservator vessel when the chambers are being filled with oil, this being effected by a feed from the bottom of the chambers.

The oil systems on each unit are separate from those of adjacent units, and connection can be made to an oil cleaning and drying plant, in which case the circulation of oil is such that the cleaned oil is returned to the conservator vessel from which the various busbars and oil-filled chambers are fed (dirty oil being drawn off at the bottom of the chambers).



33-kV metal-clad unit showing the breaker on a transportation device in the centre corridor

The chambers are made of fabricated sheet steel hydraulically tested for oil tightness and treated with a coating of special varnish. They are designed for complete phase separation throughout and all joints between oil-filled chambers are made with specially treated "Langite" gaskets employing large diameter bolts on close centres. Each busbar is carried in its own chamber, which consists of a copper tube terminating on each unit in a junction box. A special metallic flexible diaphragm is incorporated in the junction box to take up expansion due to temperature rise in the chambers.

The busbars are insulated throughout their length by "Bakelite" condenser bushings which have an earth layer running the full length of the outside supporting tube, this layer being connected to the earth casing of the busbar chamber. Projections on busbar and connection joints are enclosed in specially designed metallic electrostatic shields. The complete design of the oil-filled system has been considered with a view to facilitating the assembly of busbars and connections, and the sub-division of the oil system into two sections corresponding with the main and reserve busbars and also into phases renders it possible to extend the board, or to work on one busbar, without interfering with the remainder of the gear.

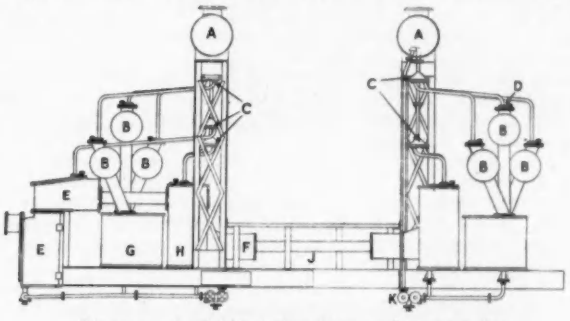


Diagram of oil-filled chambers and conservator

A. Oil conservators. B. Busbar chambers. C. Common headers. D. Relief valve. E. Current transformer chambers. F. Flexible coupling. G. Busbar spout chamber. H. Connector chamber. J. Connector bushing. K. Valves for drainage and oil-cleaning plant.

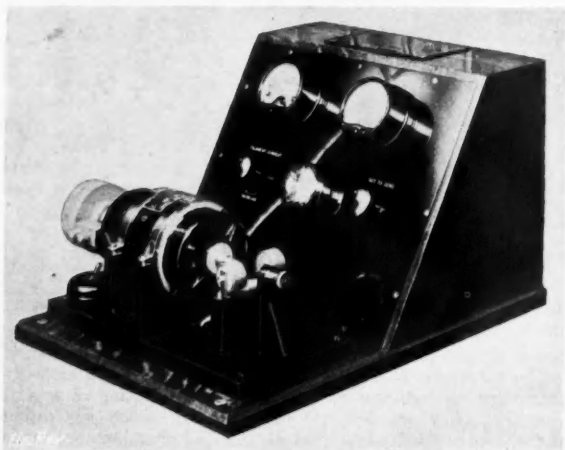
Electricity Supply in Latvia

THERE are at present sixty-five electricity supply stations in Latvia, compared with only three (at Riga, Libau and Dünsburg) before the war. The installed generating capacity amounts to 52,000 kW, according to *Elektrotechnische Zeitschrift*, of which 93 per cent. is in steam power stations, 4 per cent. in hydro-electric plants, and 3 per cent. in stations with internal combustion engines. The Riga station is of 35,100-kW capacity. The average consumption for the whole country is 54 kWh per head of population, compared with 172 kWh per head in Riga. The total amount of energy generated increased about 40 per cent. during the period 1928-1931, and was nearly 96.4 million kWh in 1931, in which year there were in service about 1,275 miles of h.p. and 635 miles of l.p. overhead lines, and 335 miles of h.p. and 248 miles of l.p. cables.

The total number of consumers in 1931 was 114,831 (an increase of 37 per cent. on the number for 1928), and of the total consumption of 82 million kWh in 1931 about 54.5 per cent. was for industrial purposes, 34 per cent. for lighting and domestic purposes, and 11.5 per cent. for tramways. The Riga station accounts for 75 per cent. of the total output, and the Libau and Dünaburg stations for most of the remainder, all the other plants being quite small. About 64 per cent. of the dwelling houses and 87 per cent. of the industrial concerns in Riga use electricity. No fewer than sixteen different tariffs are in force in Riga, the prices ranging (in 1932) from about 0.8 to 1.6d. per kWh for industrial power, to from 2.25 to 3.5d. per kWh for domestic purposes, and 8.3d. for theatres, restaurants and other "luxury" consumers (at 18.8 lats=£1). The receipts for the whole 82 million kWh consumed in 1931 averaged 2.05d. per kWh, compared with 2.4d. three years earlier.

A New Synchronous Motor

SELF-STARTING synchronous motors of the type used in clocks at present on the market have a shaded-pole element to permit self-starting and running up to synchronous speed, but their effective torque is thereby much reduced. The design of a new synchronous motor developed by Venner Time Switches, Ltd., is based on an electromagnetic principle and does not require shaded poles. The stator consists of two co-axial rings each having fifteen poles which are so assembled (with the exciting coil between them) that the poles of one half project towards those of the other, in relation to which they are staggered, the whole assembly being clamped by the framework carrying the rotor bearings.



The special testing instrument

In the rotating a.c field thus obtained is the rotor, which consists of a disc-shaped permanent magnet having three pairs of poles, each pole being slotted at the ends to form two half poles. This magnet is fitted to the spindle by a brass bush which also carries a spider of magnetic material having six arms projecting radially at 60 deg. Each of these arms is about half the width of one of the half poles (partially overlapping the space between that pole and the next pole of the rotor) and has at its outer end a small lug which projects at right angles to the face of the permanent magnet, the corner of the arm opposite the lug being backed off slightly.

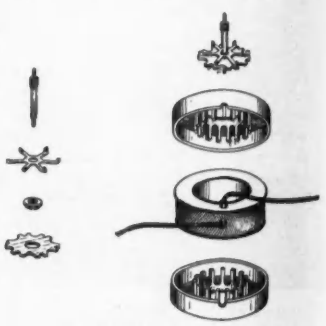
When the rotor is mounted in its bearings, the permanent magnet poles take up a position opposite poles of the stator, leaving the spider arms in a position between the stator poles. Energising the stator causes the spider to be attracted in a forward direction, thus giving the necessary amount of movement to the permanent magnet which instantly falls into step with the rotating field at 200 r.p.m. A check, consisting of a small double-ball clutch, has been fitted to limit running of the rotor to one direction only. If the rotor attempts to start in a contrary direction there will be an immediate reversal of the stator field and the rotor will then rotate in the desired direction. The rotor floats when running so that there is no end thrust.

The Venner motor will not run at any but synchronous speed. On a "falling volts" test the motor stops when the watts fall to an excessively low value, whereas a motor with shaded poles can still run as a Ferraris motor at a speed lower than the synchronous speed.

A comparison of the performance of the new motor with that of other well-known self-starting motors is given in the following table. The torque is high despite the low input. In order to obtain an arbitrary figure which should be an indication of the efficiency of all the motors tested, an "efficiency factor" was calculated by dividing the maximum weight in grammes which the motor could lift on a drum 2 cm. in diameter geared to give a speed of 1.25 r.p.m. divided by the input in watts—a method that takes into account the different speeds of the motors. The speed of 1.25 r.p.m. was chosen merely because it happened to suit stock train wheels.

	Venner Motor	A	E	G	D
Speed (r.p.m.)	200	200	200	3,000	3,000
Weight of rotor (gr.) ...	8.53	27.45	20.73	3.8	0.8
Watts at 200 V 50 cycles ...	1.32	1.42	1.6	0.5	2.5
Amps. at 200 V	0.011	0.0147	0.0144	—	0.0236
Power factor, lagging ...	0.6	0.48	0.55	—	0.53
Torque (g.c. cm.)	6.09	0.84	1.25	0.0057	0.248
Max. weight lifted on 1 cm. radius drum geared to 1.25 r.p.m. (gr.)	1107.5	134.5	200	13.75	595
Starting voltage	115	130	125	130	75
Stopping voltage	110	120	115	120	50
Efficiency factor (see text) ...	890	95.5	125.0	27.5	238.0
Train ratio	288,000	288,000	288,000	4,320,000	4,320,000

Accuracy of pole setting in the two halves of the stator is ensured by dowelling the halves to the outer brass clamping plates. The rotor, the periphery of which is ground to the spindle to ensure constant air gap, is assembled complete before it is flashed on a specially designed flasher with approximately 90,000 ampère turns. It is then tested in a device produced by the company especially for the purpose. The illustration shows this device with the motor in the foreground; the speed of the latter is controlled by a governor, and it is arranged with a splined coupling to take the pinion on the rotor spindle. A quick-release bearing is fitted opposite this to take the other end of the spindle. Two coils are placed opposite the permanent magnet which, when rotated, produces an e.m.f. in them. These coils are connected to the grid circuit of a three-electrode thermionic valve, the anode voltage of which can be accurately adjusted. A variable resistance and ammeter provide equally accurate adjustment of the filament temperature. In the anode circuit of the triode is a micro-ammeter which is set up to a full scale deflection by adjustment of the anode voltage at a fixed value of filament current. When the rotor revolves the e.m.f. set up in the grid circuit coils reduces the value of the anode current by an amount dependent upon the strength of the permanent magnet. The arbitrary figure thus obtained can be compared with the known strength of standard magnets. The circuit is arranged so that no back e.m.f. is produced in the pick-up coils. The test can be carried out in a few seconds.



Components of the motor

The existing coil is layer-wound on a moulded "Bakelite" former and "Bakelite" bushes bring the connections from the coil through the stator thus ensuring a high insulation resistance. The first train wheel is mounted integrally with the motor, and although it is of low speed has reservoir lubricated bearings, as have the two main bearings of the rotor. The motors may be used for such purposes as time switches, clocks, and meters, and are tested in conjunction with their apparatus.

Electricity on the Farm

IN a paper on some problems of applying electricity to agriculture read before the Overhead Lines Association on May 17th, Mr. F. E. Rowlands says that from the supply engineer's point of view the farmhouse load is of prime importance and it has been established that in many instances it would not be economical to furnish a supply of electricity to farms unless the farmhouse load is obtained as well.

As many operations on a farm have to be carried out in the dark, particularly during the winter, adequate lighting will result in a great saving of time and improvement in the conditions under which the work is performed. It is sometimes suggested that the cost of installing electric motors is excessive on account of the expense for wiring, but it can be demonstrated simply that the cost of electric motors including installation, is frequently lower than that for oil engines only, excluding installation. The principal use for electric motors at present is for converting existing countershaft drives. For this purpose standard industrial machines of sound design are perfectly satisfactory. It is not generally necessary to employ totally enclosed motors, and on medium-sized farms a 7½- or 10-h.p. motor is the most suitable size.

Electric sterilising is of special interest and importance, both in view of its advantages to the user and as a load to the supply undertaking. Recently a new method for dairy utensils, such as milking pails, milking machine parts, churns, bottles, &c., has been developed. An electrical outfit is now available which sets an entirely new standard for this class of equipment, both as regards convenience in operation and maximum load. It consists of a sterilising chest with a separate compartment in which steam is generated by immersion heaters. The maximum loading of this outfit is only 8 kW for a chest of 3 ft. by 4 ft. by 4 ft. capacity, and the only operations which have to be performed are to place the utensils in the chest and switch on the current. Sterilisation is completed in an hour and all labour, including the handling of fuel and ashes, is entirely eliminated.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Baking Opportunities Missed

The article referring to Mr. W. G. Morrison's lecture on "Baking by Electricity," and Mr. Poole's remarks regarding his own installation in your issue of May 5th, prompt me to write upon the subject of rates charged for electricity for this purpose. There is not the slightest doubt that the general use of baking ovens by the trade would by now have been the order of the day had supply authorities grasped their opportunity earlier.

As manager and secretary of a large wholesale cake and biscuit factory, I had to wait five years after I had made up my mind that baking by electricity was more convenient, and gave better results, apart from the general cleanliness, before I could obtain a somewhat reasonable rate plus a guarantee of so many thousands of kWh per annum. A year's use has proved the correctness of my decision, and I should further extend, but whilst satisfactory baking results are obtained, I do not feel justified in recommending my directors to adopt its use generally, as if my present maximum demand was increased I would be involved in a kW charge which would increase my running cost out of all proportion to the advantages derived from its use.

I am given to understand that if in place of a bakery we were running a catering establishment then our maximum demand would be only from 50 per cent. to 60 per cent. of our total load. Cut down the maximum rating of a baking oven to this figure and you immediately lose the advantages of quickly heating up the ovens and general control.

I learn that some supply authorities do work on a basis of so much per cent. of the maximum rating of the oven plus a unit charge (which should be very low). A few years ago the great cry was "cheap electricity for all." We were told when the grid was working the various undertakers would be able to pass on the "cheap units" to the consumer. So far as I can gather this has proved a fallacy. What we are now told is that if we were somewhere else we might get it cheaper. Whilst the price of the unit has been reduced the kW charge which must be passed on makes it worse than before.

As I have no intention of chasing the "cheap unit" my desire for further electrical extensions must be curtailed, much to my own regret and that of my operators, who appreciate the ease of heat control and the excellent results obtained.

May 15th. PUZZLED.

What is a Consultant?

May I draw the attention of your readers to the apparent misuse of the title "consulting electrical engineer" by those who, being employed by commercial firms, are not acting in an independent capacity. Some years ago, subsequent to my lecturing before the cinema industry at the Royal Society of Arts under the ægis of the Illuminating Engineering Society, I was approached by a representative of a very well-known firm in this country, one of the largest manufacturing and commercial organisations of the present day, with the object of persuading me to perform my professional duties, especially in connection with theatres, under their wing, where I would have the advantage of a well-furnished office, drawing office staff, &c., free. Despite these alluring terms, I firmly refused to have anything to do with the proposal. I assume that I correctly interpreted the rules of the Institution of Electrical Engineers as precluding a consultant from any financial or business relationship with an electrical manufacturer or contractor, so that he shall remain absolutely free and untrammelled, acting strictly in a fiduciary capacity to his clients, his charges to these clients constituting his only remuneration.

The situation is paradoxical when we find a commercial firm tendering for a job on an independent consultant's specification and at the same time soliciting orders through the agency of a salaried employé, who is described in the Press as a "consulting electrical engineer." I am informed that in the latter case the consultant's services are rendered gratuitously to the client. I can see the time coming when consultants will be paying the client for the privilege of rendering him service. Joking apart, however, the professional men, who are already suffering as a result of the prevalent depression, can ill-afford to lose clients who say that they can obtain a consultant's services free.

Is there no redress? Cannot the authorities be persuaded to insist upon the recognition of the rules of professional conduct? Surely electrical equipment contracts should be subject to the same competitive conditions in the open market as apply to all other trades involved in building works under an architect's supervision. It would be interesting if we could also have the opinions of members of the various commercial electrical associations. J. C. ELVY, A.M.I.E.E.

London, W.1, *May 11th.*

Two striking window displays which are now to be seen in Paris **(See note on page 713)**

The Trade and Overlapping

As one who has spent close upon forty years in the industry, I have noted with misgiving the open piracy carried on by various departments of the business. Manufacturers and factors are supplying goods at trade prices to any firms or individuals that care to send them an order, whether they be recognised tradesmen or not, and there are glaring instances where manufacturers are even offering "perquisites" to tradesmen to obtain business, and where factors are carrying on their businesses by offering tradesmen a kind of dividend on their annual purchases.

On the other hand we have supply authorities carrying out installation work, selling direct to the public and expecting contractors to pay rates. Further we have plumbers also carrying out wiring (and some of these cannot even compute the size of cable required to safely carry a given number of points) with the usual result—"The fire was caused by the fusing of an electric wire." And so I could go on in the wireless side of the industry.

Personally, I think it is time a halt was called and legislation on similar lines to the following was sought:—1. Supply authorities' work to end at the consumer's meter and

fuses. Showrooms to be used only for the purpose of introducing goods, which must be purchased by a prospective customer through a tradesman. 2. Manufacturers to supply only factors and the trade, and the latter only when there is no local factor. 3. No works to be supplied by a manufacturer or factor, where goods are for its own consumption, or unless they form part of a commodity to be manufactured for the trade. 4. Factors to act as distributors to the trade only, and to have no contracting interests whatever.

I venture to predict that unless legislation of this kind comes into operation in the very near future, the supply authorities will take the place of the tradesmen entirely, and manufacturers will be supplying to anyone direct, the contractors being merely required for occasional repairs, which might be handed over to the local plumber to simplify accounts.

May 8th. ELECTRODE.

Women or Men Demonstrators?

Regarding the above discussion, can it be denied that the best place in which a woman may demonstrate the domestic use of electricity is in her own home? Here, in her proper position in the order of life, doing that work for which she is

Life cannot have been dull for these mice who made their nest in the end shield of a "Brook" motor at Scarborough. (See note on page 721)

most eminently suited, the efficiency which she displays will gain interest, admiration and respect from all.

By women's incursion into the commercial activities of electricity supply a situation arises which is undoubtedly open to grave criticism. Is it right and proper, is it fair in these days of acute difficulty and rampant unemployment amongst all grades and branches of able and efficient engineers, that appointments for which they are suitable and would be glad to accept should be filled by women? A return to normal conditions would obviously place an entirely different complexion on the matter.

I am neither a showroom demonstrator nor a woman-hater—Heaven forbid—but the spectacle of women being accorded employment at all for which men are eligible arouses feelings in me which are anything but admirable or chivalrous, and I am sure there are many of the same opinion as myself. It is the supply authorities who create these posts—not the women themselves—who are to blame for this abominable practice. The second paragraph of "Woman Engineer's" letter in your issue of May 12th is a direct result of the practice to which I have just referred.

Such procedure on the part of supply authorities and employers in general, having regard to the special needs of the moment, is deserving of the severest condemnation.

May 13th. RETRENCHED.

Bare-neutral Wiring

I cannot follow Mr. Gilbert's arguments in his article on this subject (THE ELECTRICAL REVIEW, May 5th) because there can be only one such system, and that needs the neutral to be the uninsulated sheath of the two charged conductors, positive and negative to earth. This is essential. The other essential is that the two charged conductors shall be hermetically sealed and insulated throughout.

Under these conditions all leakage and creepage is automatically prevented and stray currents cannot exist. In the case of the positive conductor, should the insulation be accidentally damaged, any leakage is caught by the neutral sheath and, at worst, merely becomes a local short-circuit which may be easily located. In the case of the negative conductor, the sheath is neutral to earth, but positive only to the conductor within, and any leakage must obviously be inwards to the negative conductor, and can have only the same purely local effect as before.

It is impossible to reach any charged conductor without deliberate interference with either the conductors or the apparatus connected. It is therefore perfectly safe under these conditions to sit in a bath and hold any piece of apparatus in the bare hand or let it touch the bare body; the system was suggested with that in view. There is no invention in it, nor can I, although alone in the demand for it as the natural and only safe system, take any credit for it beyond what is due to all who use common sense.

Every case of death from shock, under ordinary usage of electrical energy, has been due to neglect of possible precautions in the wiring of premises or in the manufacture of apparatus. All the evils enumerated and feared by Mr. Gilbert would be eliminated by the compulsory adoption of concentric conductors and the necessary suitable accessories.

London, S.E.12, *May 9th.* E. G. PINK.

Domestic Water Heating

The many detailed figures given in Mr. Jervis's article in your issue of May 12th show how very thoroughly he has gone into this matter, and although in some cases my own figures and experience do not entirely agree with his, I think that where the habits of individual households have so much influence one must not look for too close a correspondence in every detail. I have kept figures for some years and can confirm one result that he has arrived at, namely, that on an average three gallons of hot water suitable for household purposes are obtainable per unit of consumption. I first heard this stated by Mr. C. H. Smith at an E.D.A. meeting, and it bears out my figures for several years.

I cannot, however, agree with Mr. Jervis that time switches are unnecessary for off-peak water heating. I am familiar with all the arguments, of course, and I can imagine that the cynical will say that in my case the wish is father to the thought, but for my own information I had a recorder in circuit for two years and found that on an average the water-heating load came on during peak time five days out of seven. There are two points I would urge in connection with this: the first is that for those taking supplies from the grid this off-peak business may be turned from a profit to a loss if it is added to their maximum demand; the other is that water heating is one of the things that can well be done during the night time, with perhaps two boosts at off-peak periods during the day, and that it is surely better to be quite certain that this cheap load will never be added to the existing load on transformers, distributors and services.

If my experience were an isolated one it would perhaps not be worth quoting, but there is ample corroboration of it from a great many sources. It takes very little in the way of maximum demand charges to pay outright for time switches, while the saving in the other items mentioned makes the use of these instruments surely worth while. ERNEST E. SHARP, *Director*, Venner Time Switches, Ltd.

New Malden, *May 12th.*

One must heartily agree with Mr. Jervis when he stresses the danger of "high pressure salesmanship" in that field. The success of any type of installation is entirely dependent on the extent to which specialised knowledge controls selling effort. But when he goes on to describe immersion heaters as "an inexpensive, highly efficient method of producing hot water" one feels that he is not exercising the necessary caution. Mr. Jervis has merely allowed himself to deal with the less satisfactory method of heating water, and he has deprived himself of the chance to enlarge upon the many superior points of the electric storage heater when it is similarly applied.

There can be no doubt as to the superiority of the storage heater over immersion heaters for domestic water heating. It has about half the loading of immersion heaters for the same service and consumption—a point of special interest to supply authorities, many of whom would scarcely accept the view that a large number of immersion heater installations would not affect their peaks, or be willing to supply a time switch with each installation; the lagging of the storage heater is far more efficient than that which can be applied to a hot water cistern; and the alterations to the existing pipework required in the case of a storage heater are far fewer in number and much easier to accomplish than those required for the satisfactory working of immersion heaters.

The only point in favour of using immersion heaters is that they are usually cheaper to install. Taking the figures given in the article and comparing them with the cost of a 12-gal. storage heater (which would give the same service) the differ-

ence between the cost of the methods is very little indeed. (Incidentally the fitting and wiring in the case of the storage heater are considerably simplified.) Such difference as does exist would unquestionably be very quickly justified by the lower running cost and better hot water service in the case of the storage heater, due to the higher efficiency of the heater itself. So that the apparent saving in cost is a very doubtful argument in favour of immersion heaters.

Mr. Jervis has shown that expert attention is required in order to ensure that such installations may be successful. It will be noted that conditions (apart from rates) have to be very, very favourable before an installation can be recommended. Such conditions are very elusive in practice, so that the chances of failure very much exceed those of success if immersion heaters are adopted as a standard form of water heating. On the other hand, there is no case in which storage heaters cannot be applied with every success.

There are two further points in the article which I think are worthy of mention. The first arises in the layout diagram which is included. The pipe run to the tap at the sink, as shown in the diagram, is very long, which is exceedingly bad practice. Taken in conjunction with such a pipe run the figure of 88 per cent. for efficiency has, I feel sure, been an oversight on the part of the author. The second point concerns the practice of fitting "traps" in the form of inverted "U" bends to expansion pipes. This is bad plumbing practice and is frequently responsible for air-locks and other expansion troubles. Expansion pipes should always be as nearly vertical as possible, and in cases where excessive losses are likely to occur the pipes should be lagged.

All who are interested in electric water heating will agree that we cannot have too many helpful articles from experienced engineers like Mr. Jervis, and it seems a pity that such articles should not extend to sections of the subject which demonstrate more fully the immense possibilities in the field of water heating.

JOS. KIRBY.

London, S.W.1, *May 15th.*

The constructive article on this subject in your issue of May 12th should be helpful to those engaged in quoting and supervising such installations. In the smaller and fairly modern houses the problem of providing hot water by electricity can be solved as the author suggests by immersion heaters in the existing tank, but in the older and larger houses it is often disappointing. Unless one is certain that the pipe lines are so arranged as to ensure reasonable efficiency in actual use it is better to avoid immersion heaters and recommend a self-contained storage tank arranged to supply two or three taps only. It is rarely possible to find out how wrong a hot water system is until the men are on the job, and then it is too late to amend the contract.

Examples of lighting in the Mukden premises of the Hong Kong and Shanghai Bank (G.E.C.)

Mr. Jervis deals mainly with heaters suitable for square tanks, whereas in some districts they are generally cylindrical, and although short tubes can be fitted horizontally there is much to be said in favour of vertical heaters. Those of the circulator pattern which deliver the hot water speedily to the top of the cylinder have the added advantage of providing small quantities of hot water quickly.

When all is said and done, the fact remains that each water-heating job must be considered on its merits, and the salesmen who are tackling this problem are deserving of every encouragement and more adequate remuneration than some of them receive.

E. THOMAS.

Hall Green, Birmingham, *May 13th.*

In a list of data given in Mr. Jervis's article is the statement "1 kWh will boil 1 gal. of water in about 30 min." Surely this should be "1 kW." Hence it follows that ¼ kWh will boil 1 gal. of water, which is supported by the accompanying text, where it is stated that ¼ kWh will raise ¾ to 1 gallon to 175 deg. F.

The article, and particularly the figures, make me wonder whether the cost of cooking and water-heating by electricity can be favourably compared with the cost of coal for a kitchen range with the boiler behind; it would be interesting to know if such a comparison has ever been made with due regard to the labour saving and convenience of the electrical installation.

INTERESTED.

May 12th.

[As our correspondent suggests the term kWh should have read kW.—Eds. ELEC. REV.]

The Electrical Association for Women

According to "A London Member" the E.A.W. is only intended for women who (1) have plenty of time on their hands for the well-attended functions such as balls, dinners, &c., or (2) are supplied with funds by their husbands, most of whom hold important positions in the electrical industry. Now we know the fate of any lady demonstrator or other *useful* female member of the electrical industry who dares to intrude into this very exclusive assembly of grand dames.

The people who utilise electricity for domestic purposes most are certainly not represented by the E.A.W. as described by "A London Member," but by the great class of ordinary and dear women who live in small houses, know how to cook, and do their own house work. Their husbands cannot afford to supply them with funds for social functions for the reason that they do not hold "important" positions in the electrical or any other industry.

It does not follow that because a man is important in the electrical industry his wife is of any use as a member of the E.A.W. I would remind "A London Member" that there are many excellent clubs in London which cater for "bright young people" and even for staid and mature ladies with plenty of time and funds on and in their hands.

Bexleyheath, *May 12th.*

A. J. ABRAHAM.

Electric and Oil Heating

Your leaderette of May 12th on this subject calls for some explanation. I shall be obliged if you will state why you have scaled down the oil burner efficiency to 12 per cent.; why not 50-55 per cent?

The electricity supply industry cannot prosper if the public it supplies is not thoroughly satisfied. I am sure that, given fuel oil at 90s. per ton and electricity at .5d. per kWh, a conversion to electric heating would produce that type of consumer calculated to impede the progress of large-scale heating by electricity. The 1d. per gallon increase in oil fuel prices is already getting worn threadbare as an argument in favour of scrapping private plant and taking supplies from a company.

I would remind the users of such arguments that in the majority of oil-engine driven stations this 1d. per gallon means an increase of only .06d. per kWh. Hence to oust the oil engine they must conspire with the powers that be to add a few more pennies per gallon.

DEEPLY INTERESTED.

May 14th.

[Data in our possession based on American practice show that the efficiency of oil furnaces is commonly from 5 to 15 per cent. and of electric furnaces from 85 to 95 per cent.—Eds. ELEC. REV.]

The Marconi-Philips Patent Action

In the Chancery Division on May 16th Mr. Justice Maugham fixed June 13th for the hearing of the action of the patent action brought by Marconi's Wireless Telegraph Co., Ltd., against Philips' Lamp Co.

Cooker Construction

IN our issue of May 13th, 1932, we gave an account of the arrangements made at the Bradford works of the English Electric Co., Ltd., for the manufacture of electric cookers and fires. Since then development has been rapid; the 1- and 2-kW fires have been placed on the market (ELECTRICAL REVIEW, August 5th, 1932), and later one model—the " Medium de Luxe " Nos. H.C.205-206—of the cooker became available and was described by us (September 23rd, 1932). On the occasion of a recent visit of the Leeds and District Branch of the Electrical Association for Women to Bradford, we took the opportunity to inspect the two latest models available—the " Small de Luxe " H.C.203-204 and the " Cottage " H.C.201.

The principal dimensions of the models in inches in the order of width, depth, and height and loadings are as follows:

Model.	Overall. in.	Cooking Space. in.	Warming Cupboard. in.	Grill Hotplate. in.	Boiling Plate. in.	Price.
Cottage (201), 2 to 4 persons	21, 20, 36½	12, 13, 11½ (1,400 W)	15¾, 17½, 5½	9, 7½, – (1,800 W)	8, 6, – (1,600 W)	£11 4s.
Small de Luxe (203), 3 to 5 persons	23, 22½, 37¾	12½, 14, 12½ (1,800 W)	18, 18, 5	7, 7½, – (1,500 W)	8 dia. (1,600 W)	£13 13s.
Medium de Luxe (206), 5 to 8 persons	24¼, 23¾, 37¾	13¾, 15½, 14 (2,200 W)	19, 19¼, 5	9, 7½, – (1,800 W)	8 and 6½ dia. (1,600 and 1,000 W)	£16 0s.

The prices cover mottled vitreous enamel finish but not splash-plates and plate racks. Model 204 is provided with an additional " Chromalox " 5½-in. dia. 600-W boiling plate and costs £1 4s. more than Model 203. Model 205 is without the 6½-in. boiling plate and costs £1 7s. 6d. less than Model 206. " Chromalox " stainless steel plates can be fitted to the two larger sizes for 3s. 6d. extra. Semi-black finishes will also be provided at somewhat lower prices.

The " Cottage " cooker

The " Cottage " model has been designed with a view to low first cost; the plug-in elements, standard throughout on the larger cookers, are used only for the oven, quick-release connections being supplied for the boiling plate and grill hotplate. The non-tilting rod shelves seemed to us a serviceable improvement on the ordinary type. This model is not normally supplied with fuses in individual circuits; as most circuit fuses blow due to deterioration rather than from overload, which is looked after by the main fuses, this would appear to be quite a justifiable departure from current practice. The other two models have wire-bridge circuit fuses, but cartridge fuses will be fitted if required for a slight additional amount. Any make of hotplate can be supplied, but the standard types are " Chromalox " and " Margo."

Some of the features of the cookers which especially engaged our attention were the use of solid pointed plugs, slit in the body and slightly " ballooned "; the labyrinth path which must be travelled by grease before it can reach the plug-in contacts making fouling, we should expect, virtually impossible; the real " fitter's job " of the oven door; the well-balanced springs of the grill-cupboard door; the use of incorrodible metal throughout, such as stainless steel for the element covers and nickel-silver washers; the recess for the thermometer inside the oven and the easily read indicator outside; the method of cementing the lagging chambers; the recessing of the drip-pan at the four corners which provides legs to prevent fat from burning; and the most adequate bonding of all earthed parts.

The arrangement of the bottom heat elements near the front of the oven to prevent condensation is one of the most notable introductions. Another is the enamelled surface of the malleable-iron grill-plate which enables it to be used for certain culinary operations without the use of a utensil; the heat insulation caused by the enamel is almost negligible. The elements of the grill are staggered in two layers, and at reduced rating the whole surface of the plate is equally heated. The company has found an important talking point for the Yorkshire housewife in the adaptability of the oven for bread-making; the " Cottage " size is large enough to take the dough pans for six 2-lb. or eight 1½-lb. loaves, and the grill-cupboard without additional heating provides adequate " proving " accommodation.

What struck us most at first glance was the large amount of workshop space now devoted to the manufacture, by flow-production methods, of cookers and fires compared with that of a year ago. The large storage accommodation available indicates that the company is ready to meet any demands without delay. A good feature appeared to us to be the use of cardboard cartons for the fires, thus dispensing with crates (and the trouble of unpacking and returning them).

A new departure by a company of established reputation for general electrical engineering has the advantage that the experience of all departments can be called upon to ensure sound design in details. It is evident that the English Electric Co. has availed itself fully of these resources as well as of the twenty-five to thirty years' specialised experience of Messrs. W. R. Gillott and F. Smith.

The Leeds members of the E.A.W., of which Mrs. W. B. Woodhouse is president and Mrs. Morshead hon. secretary, were received by Mr. L. S. Sarjeant, general manager of the Bradford works of the English Electric Co.

The Year's Work of the I.E.E.

AT the annual general meeting of the Institution of Electrical Engineers held on May 11th, Professor E. W. Marchant, president, proposed the adoption of the Council's report for the year ended March 31st, 1933.

Most of the offices rendered vacant by the removal of the B.B.C. have been taken by the British Electrical and Allied Industries Research Association, apart from those required for extensions by E.D.A. and E.L.M.A. and by the Institute of Transport.

Mr. G. H. Swingler has been appointed as local hon. secretary for the Cape, Natal, and Rhodesia in place of Mr. Frank Pickering. Local committees have been set up at Bombay and Lahore.

The membership of the Wireless Section is now 624. Five papers and two lectures were presented and the average attendance was 135. The Meter and Instrument Section held nine meetings with an average attendance of 95 out of a membership of 604. Eleven informal meetings were held; the average attendance was 101, as against 62 last year. Eight papers were submitted by students and by graduates under the age of twenty-eight for the £5 prize on the subject of " The Relations between Economics and Engineering," which was awarded to Mr. T. A. Long. Seven scholarships, valued at between £25 to £250 per annum tenable for from one to three years, were awarded. Two grants of £50 each were made for research purposes from the War Thanksgiving Fund.

In response to the desire expressed by the Prime Minister for definite suggestions from responsible bodies for the amelioration of the industrial position, a letter was addressed to Mr. Ramsay MacDonald in March with regard to (1) extension of electrical distribution, (2) railway electrification, and (3) acceleration of telephone plant construction.

The Electrical Engineers' Ball (the organisation of which was transferred to the committee of management of the I.E.E. Benevolent Fund) yielded a surplus of £224, which was handed over to the Fund. The total assets of the fund at December 31st, 1932, were £21,775, of which £17,812 was on capital account and £3,963 was in respect of unexpended income. Donations and subscriptions amounted to £2,314, and grants aggregating £1,956 were made to forty-four persons.

The physics and electrical volumes of *Science Extracts* were subscribed for by 786 members, and the electrical only by 576; the Council expresses the hope that more members will subscribe for the publications (which can be seen in the library). The annual terms to members are 20s. for both sections or 12s. 6d. for one section; for students and graduates under twenty-eight years of age there are special rates.

The surplus on revenue account for the year ended December 31st, 1932, was £7,414, which compares with the deficit of £428 in 1931 that was due to expenditure on the Faraday celebrations. The assets amounted to £201,795 against liabilities of £11,981, leaving a surplus of £189,814 (£182,400 in 1931). The membership of the various grades of the Institution at April 1st, 1933, was as follows, the 1932 figures being given in parentheses: Hon. members 14 (13); members 1,967 (1,969); associate members 5,956 (5,822); companions 112 (116); associates 1,450 (1,542); graduates 2,862 (2,498); students 2,788 (2,924); total 15,149 (14,884).

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Universal "Bakelite" Joint Box

MESSRS. W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., Holborn Viaduct, London, have brought to our notice a new universal "Bakelite" joint box which they are marketing at 10s. for five. This is an addition to the "Nomet" wiring system.

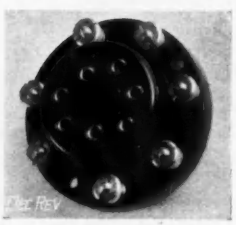
Each side of the box is arranged with thin fillets which can be easily broken out to provide entries for the cables. The large centre entry holes covered by the "breakout" fillets will accommodate two "Nomet" flat twin cables up to 3/.036 in., and the small side holes will take one similar cable.

The Henley "Bakelite" joint box

Provision is made for fixing the base to the wall independently of the lid, the latter being held to the base by two captive screws. A back entry feature is incorporated, the removal of the fillets in the bottom of the base providing two entry holes each suitable for a flat twin cable up to 3/.036 in. No terminals are included in the box, the connections being made by means of porcelain connectors.

A 7-pin Valve Holder

MESSRS. FERRANTI, LTD., Hollinwood, Lancs, have just introduced a new 7-pin valve holder, priced at 2s. 9d. It is suitable for class "B" output valves, double-diode triodes, and other special valves. Flexible sockets are incorporated and the moulding is black "Bakelite," while large, robust moulded-in terminals are provided.



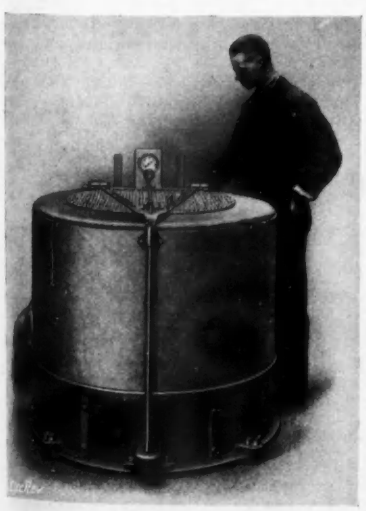
The new "Ferranti" valve holder

An Electrically Driven Hydro-extractor

What is claimed by the makers to be "the only self-balancing, direct electrically driven extractor in the world for alternating current" has just been put on the market by MESSRS. THOMAS BROADBENT & SONS, LTD., Central Ironworks, Huddersfield.

The machine complies with the recent Home Office recommendation that all hydro-extractors should be fitted with a positively interlocked safety cover, so that they cannot be started until the cover is closed and the cover cannot be raised until the basket comes to a dead stop.

The motor, which can be direct coupled to the basket spindle, is of the high starting torque type capable of giving eight to ten starts per hour without overheating. Reversing contactor-type control gear is used and is operated from a time clock mounted on the top of the extractor. The contactor panel is suitable for wall mounting, fitted with overload and no-volt releases, and connects the motor direct across the line in both directions.



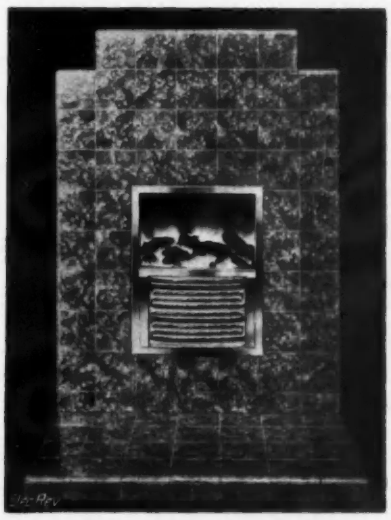
The Broadbent hydro-extractor

Other features are a self-balancing basket, time-clock starter, time-limit control, automatic stop, and reverse-current brake. The ball bearings will require replenishment with grease about every eighteen months. A 30-in. machine attains a speed of 1,480 r.p.m. in 30 sec., and six changes per hour are obtainable. The basket can be supplied in galvanised steel, copper, monel, or stainless steel. Steel baskets are constructed without riveted joints, and copper baskets from a seamless shell without joint.

The machine is made in three sizes, the gross capacities of the baskets being 4, 5.5, and 8.5 cu. ft. The intermittent ratings of the motors are 6, 6, and 10 h.p. with continuous ratings or 1.5, 2, and 4 h.p. respectively. The corresponding floor space required is 5 ft. by 5 ft., 5 ft. 6 in. by 5 ft. 6 in., and 6 ft. by 6 ft.

Vacuum Cleaner Modifications

The SUNBEAM VACUUM CO., LTD., 28, Shepperton Road, Islington, N.1, informs us that this year's "Sunbeam" and "Triumph" vacuum cleaners, priced at £6 16s. 6d. and £8 8s. respectively, are fitted with "Bakelite" motor stators. Both models are loaded at 220 W, the suction being 30 in. and 28 in. of water respectively, with an air displacement of 20 cu. ft. and 30 cu. ft. per minute for the two models.



A "Magicoal" newcomer, made by Messrs. Berry's Electric, Ltd.

Accumulators for Radio Hire Service

Special type batteries for use by radio dealers who operate an accumulator hire service have recently been introduced by the NATIONAL ACCUMULATOR CO., LTD., 50, Grosvenor Gardens, S.W.1.

If a certain quantity of the cells known as the "B.D." type is ordered, accumulators with the trader's name, address and telephone number moulded on the panel of the containers can be supplied, the only extra cost being for the actual name die. Two types of cell are available, the "B.D.5" of 32-Ah capacity and the "B.D.7" of 48 Ah, both at a 20-hour discharge rate.

Large Electric Incubators

Apart from its advantages over gas and oil-heated models, the all-electric cabinet incubator saves a large amount of space as compared with the old type hatchers. For instance, one of the new models marketed by MESSRS. SPRATTS PATENT, LTD., 58, Mark Lane, E.C.3, has a capacity of 70,000 eggs and yet measures only 20 ft. by 14 ft. by 9 ft. Type "A," for 720 eggs, has a G.E.C. ¼-h.p. motor with heaters loaded at 570 W. Five other models are available, and these are all fitted with ¼-h.p. G.E.C. motors. They are known as types "B," "C," D," "E," and "F" respectively, and have heater loadings of 850 W, 970 W, 1,200 W, 1,780 W, and 2,400 W, and egg capacities of 1,440, 2,880, 5,760, 10,080, and 20,160 respectively.

Spratt's type "C" incubator

"Neonic" Sign Lamps

Another neon gas-filled lamp development of MESSRS. SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, E.C.4, is the "Neonic" sign lamp illustrated overleaf.

These new lamps operate at normal supply voltages, so that they do not require high-frequency coils or high-voltage transformers. They are simply plugged in like an ordinary lamp. The tubular type lamp has a centre contact cap at each end, one of them connected to the anode and the other to the cathode, which are metal rods extending the full length of the tube. Across these parallel "bus-bars" are clipped letters punched out of metallised paper, the word or message

D

being thus enclosed within the sealed glass tube. The characteristic orange-red glow makes each letter boldly prominent, while the tube itself remains transparent without glow.

Dimensions are standardised, so that the lamp will accommodate up to a maximum of ten clear-cut letters, sufficient

The new "Neonic" lamp

to cover practically every word in ordinary use while maintaining good legibility. In the case of shorter words the letters are arranged centrally in the lamp, so that signs of several letters can be made up so as to be easily read.

To accommodate "Neonic" sign lamps and to provide a pleasing ensemble attractive housings have been specially designed. They are so arranged that the lampholders are held in spring clips, so that when it is desired to alter the lettering of a sign the change-over from one lamp to another is a simple operation occupying only a few seconds.

The cost of operation is small, a simple sign lamp having a load of only about 5 W. There is no filament to break, so that damage in handling is considerably diminished, and their very low current consumption makes the lamps practically cold in operation.

The signs are eminently suitable for use in stores, retail shops, warehouses, banks as direction indicators, and for shop-window announcements, as counter signs, and as house signs.

Mains Transformers

Lack of uniform mains voltages throughout the country might necessitate scrapping a great deal of expensive apparatus when one moves from one locality to another. Mains transformers will avoid this, but they can, of course, only be used on a.c. supplies.

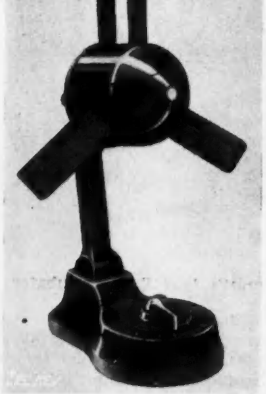
The Heayberd "Model 400" mains transformer

MESSRS. F. C. HEAYBERD & Co., 10, Finsbury Street, London, E.C.2, have sent us their latest type of power transformer, "Model 400," for stepping up the mains voltage from 100/110 V to 200/250 V, 50 cycles. On the mains side there are plug-in terminals for 100- and 110-V supplies, while the output terminals give voltages of 200, 220, and 250.

The transformer, which is rated at 100 W, can also be connected up the reverse way for stepping down a 200/250-V supply to 100 or 110 V. The price of the instrument is 22s. 6d.

Flexible Trailing Cables

Good flexible trailing cable is essential for portable electrical machinery and should be capable of giving "trouble-free" service under working conditions, which in many cases, particularly in quarries or underground in collieries, &c., are exceptionally severe from the point of view of mechanical damage.



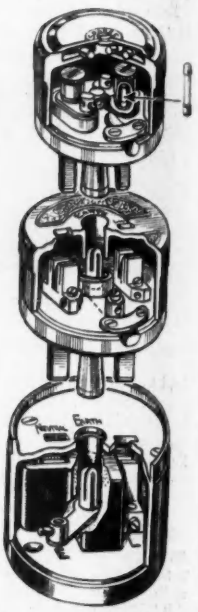
The new "Bandolero" fan with fabric "blades," sold by the Edison Swan Electric Co., Ltd., at 45s., in mahogany or walnut finish

"Rhino" tough rubber sheathing, marketed by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, and made at the factories of PIRELLI-GENERAL CABLE WORKS, LTD., is a recent development in the production in protective sheathing for heavy duty trailing cables and is a great advance on the old cab tyre sheathing previously employed for this work. It is tough, hard-wearing, and highly resistant to abrasion—its tensile strength is over 4,000 lb. per sq. in. of cross section (approximately double the strength of normal c.t.s.), and the high resilience ensures maximum protection against crushing of the cable. The material used offers very considerable resistance to tearing, so that an incision at any point will not spread along the cable, and the manufacturers claim that its superior elasticity renders the cable more flexible. A long life can be relied on even under hot conditions.

On average sizes "Rhino" cable is about 10 per cent. lighter in weight than a normal c.t.s cable. The sheathing is highly resistant to the action of oils, acids, and alkalis, and corrosive waters.

A Domestic Plug System

In introducing the "Wylex PW" system for domestic plug connections MESSRS. GEORGE H. SCHOLES & CO., LTD., Blantyre Street, Hulme, Manchester, have made a definite attempt to cater for all the requirements of the ordinary household by a comprehensive but simple system of interchangeable connections. The idea behind the scheme is that the consumer can plug in small appliances in any socket in any part of the house without duplication of sockets and with adequate protection for low-loaded equipment.



Construction of the 15-A socket "Dual" plug and fuse plug accessories of the "Wylex PW" system

Brief references to each of the four accessories embraced by the system will explain fully the scheme as a whole. A 15-A "Wylex" switch-plug socket for use in rooms in which both radiators and small appliances are likely to be used follows the design of the "Wylex" switch-plug socket with flat pins, which we have already described, except that by off-setting the actual sockets slightly in opposite directions the unit is now polarised, and by means of a projecting collar at the periphery of the socket face additional protection is given against contact with the pins by the fingers.

The polarised "Wylex Minor" socket is a 5-A device built on similar lines, but without the quick-break feature. It is intended for all rooms in which small appliances only are to be used. The polarised "Wylex Dual" plug is a 15-A plug embodying a socket connection for a 5-A plug.

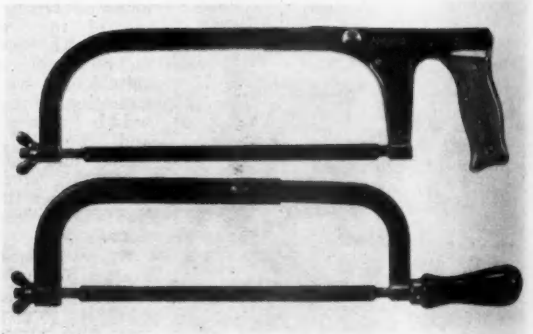
The polarised fused plug will fit into the "Minor" socket, the "Dual" plug, or into the 15-A socket direct, so that it can be used at any one plug point. The 15-A socket is available in four types: surface, sunk with iron box, iron-clad surface, and flush "Bakelite," the last costing 5s. 4d. each. The "Minor" socket, "Dual," and fused plug are listed at 1s. 8d., 2s. 6d., and 3s., each respectively.

Hacksaw Frames

MESSRS. JAMES NEILL & CO. (SHEFFIELD), LTD., Napier Street, Sheffield, have sent us samples of two new designs of hacksaw frames which they have just commenced marketing.

The "Eclipse 40 P.G." model has great strength and rigidity provided by the use of bright drawn 45 per cent. carbon steel specially tempered, and a bend of large radius at the forward end of the bow. The handle is specially designed to give a comfortable grip in the natural position and facilitates control over the blade, and non-removable swivelling tension pieces are fitted similar to those on the "20 T." frame. The flat section of the bow bend is graduated and marked 8, 9, 10, 11, 12 in., which enables easy adjustment to be made for the various lengths of hack saw blades. The price is 5s. in nickel-plated finish.

The "Eclipse 60 B." frame is made from the same steel as the "40 P.G." type, and its strength is considerably increased by the oval tubular bow bend at the front. This provides at the same time a comfortable grip at the forward end of the frame. The handle is made from attractively polished hard wood of ample dimensions to fit the hand, and the fixed tension piece, which is forced into the handle, is held rigidly by a transverse pin, and can be swivelled for the blade to cut at right angles to the frame. The flat section of the bow bend is graduated in the same way as the "40 P.G." frame. The price is 2s. 6d.



"Eclipse 40 P.G. and 60 B." hacksaw frames

"Northmet" Showrooms

THE place of the showroom in any progressive scheme of commercial electricity supply development is a very large one. If undertakings which have so far taken no action in this class of work would investigate for themselves what is happening in places where the public is every day and night reminded of the existence and activities of the system which serves the town or district, they might quickly change their minds and follow suit. A sincere and unprejudiced approach, with the interests of their own locality at heart, would prevent them from declaring, until they were perfectly sure, that they were too small to be able to afford it.

We are able to supplement our notes on showroom progress in the area served by the North Metropolitan Electric Power Supply Co. with references to recent happenings. We do so in detail because we are anxious that work of this character should be kept in the foreground just now, encouraging all who can to go and do likewise.

As already stated here, a plot of ground in the centre of Wood Green was secured for a main showroom and offices, and a temporary showroom was actually on the spot. The London Underground Railways Co. put at the company's disposal a large hall at the back of the Wood Green station and opening out from the concourse of that station. This has been equipped by the "Northmet" local staff in a very short time as an electrical showroom and offices. It was opened to the public on May 9th. Certain additions have still to be made, but it forms a very attractive display as our illustrations show.

The little temporary showroom of the collapsible portable type referred to above has thus been released, and it will now be taken over as "No. 3 Travelling Showroom." It is the practice to put down these portable showrooms for about two or three weeks at a time in some place where supply is available, but where there is no showroom; they are used as centres for canvassing and sales generally. In addition to these three portable showrooms, there is a travelling showroom which has a self-contained generating equipment. This is used as a feeder to the three portable showrooms and also goes to give demonstrations and exhibitions where no current is available. An illustration of this also appears. The company is also to equip another showroom outside the Southgate station of the new Cockfosters extension.

On the Great North Road in Whetstone a new showroom is practically completed and will be opened very shortly. It is really in the Friern Barnet district and will act as a second showroom for this area; it will also serve the Oakleigh Park area, which is in the East Barnet Valley. The boundaries of the various districts here are very curious, as one side of the Great North Road is in Finchley and part of the opposite side is partly in Finchley and partly in Friern Barnet. The site, however, is a suitable one from which to deal with all the surrounding district. East Barnet Valley has not hitherto had a showroom as it has been served from High Barnet, but the developments to the west of the London & North Eastern Railway main line are so extensive that it has been decided to open a lock-up showroom in this neighbourhood.

In the western part of the area a showroom, with a residence above it, is being secured. This is actually in Harrow Weald (to the north of Wealdstone), which has never had a showroom of its own. These premises will serve not only the residential district of Harrow Weald, which has developed very considerably, but the smaller district of Wealdstone lying to the south.

It is found that as business increases in the various areas additional room in the showrooms is required and very often it is desirable to make further provision for cooking demonstrations. A year or so ago the showroom at Palmers Green was altered in this manner, practically doubling the floor space, and at the present time similar alterations are in hand at Chingford and also at Stevenage. In the latter place an older type of showroom is being modernised and enlarged.

The "Northmet's" travelling showroom in an old-world setting

The Lion and the Lamb!

A point of unusual interest is to be found at Bishop's Stortford, where the "Northmet" company is at the present time completing a very good gas showroom! The problems connected with it are interesting and somewhat different from those applying to an electrical showroom. The electricity and gas undertakings belong to one company and the Electricity Department has already been supplied with a very beautiful showroom—the reconstructed "White Horse Inn" referred to recently in the ELECTRICAL REVIEW.

There was no showroom for either side of the undertaking when the "Northmet" took over, apart from a little room at the gasworks themselves. Formerly, both sides of the business were under one management, but the "Northmet" company decided that it would be better to keep them separate. One wonders how it would be possible to run the two undertakings properly by a common staff! The principle adopted is to give each side of the undertaking equal facilities and leave it to the staff to make the best progress they can, always adopting the established "Northmet" principle not to decry the wares of one's competitors.

The laundry section and the demonstration kitchen at the Wood Green station showrooms

Parliamentary News (BY OUR SPECIAL REPORTER)

ON May 9th Mr. Hales asked the Postmaster-General whether, having regard to the inconvenience and delay caused through the inefficiency of the dial telephones, he would arrange for the exchanges not already converted to remain in their present condition.

Sir K. Wood said that the operating statistics showed that the service given by automatic exchanges compared favourably with that given by manual exchanges. If Mr. Hales had information of specific instances of difficulty with the automatic service, and would let him have particulars, he would be pleased to have them investigated; but he was not aware of any ground for staying the process of conversion to automatic working, which was, he believed, giving general satisfaction.

Duties on Electric Clocks

On May 10th Mr. Hall Caine asked the President of the Board of Trade if he could state the reasons for the inclusion of electric clock movements among the complete clock movements upon which reductions of duty had been made under the new Anglo-German agreement; and why a different policy was observed with regard to complete clocks.

Mr. Colville, who replied, said that the inclusion of electric clock movements in the agreement was due to a clerical error which had since been rectified by an exchange of notes with the German Government. The resolution passed by the House did not provide for a reduction of the duty on electric clock movements.

American Electrical Refrigerators

On May 11th Captain Cunningham-Reid asked the President of the Board of Trade if he was aware that, at a recent trade exhibition, electrical refrigerators of American manufacture were on exhibition in circumstances tending to suggest that they were British; and if he would take steps to make an Order in Council, under Section 5 (2) of the Merchandise Marks Act, with regard to electrical refrigerators.

Mr. Runciman said that investigation was being made into the circumstances referred to in the first part of the question. Orders under the Merchandise Marks Act, 1926, could only be made on the recommendation of the committee which had been set up under the Act, following an application to the Board of Trade by the interests concerned. No such application had so far been received.

Scottish Electricity Orders

On May 11th, Sir G. Collins, Secretary of State for Scotland, moved the second reading of the Private Legislation Procedure (Scotland) Bill. He explained that the object of the measure was to amend the existing Act of 1899 for the special purpose of bringing a larger volume of Scottish private legislation within the procedure established by that Act. Speaking generally, the procedure was as follows: Draft Orders were deposited in place of Private Bills, and the chairmen of both Houses had the duty of deciding whether they should be dealt with as Private Bills or inquired into in Scotland, under the name of Draft Provisional Orders, by four commissioners, usually two from each House of Parliament. If the report of these commissioners was favourable, a Provisional Order might be made by the Secretary of State. This was afterwards submitted by him to Parliament as a schedule to the Confirming Bill. The system had been in constant use since 1899 and had worked most satisfactorily, both from the point of view of the promoters of private legislation and from that of Parliament, which had been relieved of the burden of detailed examination of some 540 of these measures in thirty-four years. But in 1899 the procedure was entirely novel, and not unnaturally certain exceptions were made to, and limitations put on, its use.

As all concerned had become increasingly familiar with it, the feeling had grown in Scotland that the time had arrived to review these exceptions and limitations and widen the scope of the operation of this system of Provisional Order and Confirming Bill. One of the exceptions in the Act of 1899 was that the system could not be applied to the authorisation and regulation of the supply of electricity for lighting and other purposes. There seemed no good reason why that exception should be continued. It was introduced, perhaps, because in 1899 the use of electricity was still in its infancy and Parliament apparently felt that it should retain direct control over the extension of that dangerous and then unfamiliar force. Such a view belonged to a bygone age and the House would agree that it was time to discard it. By the amendments proposed in the present Bill, at least half of the Scottish Private Bills which had come before the House of Commons would have been dealt with as Provisional Orders. For the future, every purely Scottish private legislative proposal, except those dealing with novel and important questions of public policy, would be inquired into first in Scotland, and, on the basis of the past, less than ten per cent. would proceed by way of Private Bill, and even a smaller proportion than ten per cent. in the case of opposed measures. The saving of time and money would be considerable.

The Bill was read a second time.

The Proposed Middlesbrough Relay Service

A Select Committee of the House of Lords, presided over by the Marquess of Bath, had under consideration on May 11th a Bill promoted by the Middlesbrough Corporation to obtain various powers, including authority to establish and carry on a station for the reception and relaying of broadcasting matter by means of any electric line for the time being belonging to the Corporation, and to publish and advertise programmes of broadcasting matter. At the second reading stage the House passed a resolution directing the Committee to give special attention to this proposal because of its novelty.

Mr. Maurice Fitzgerald, counsel for the Corporation, explained the system, and said that the advantage to the individual was that he got rid of the necessity of installing an ordinary receiving set and only needed a loud speaker. He could obtain this service at a cost of something like 2s. a week, which included the cost of the Post Office licence. It had been found that broadcasting matter could be sent along the ordinary electric light or power mains without impairing the ordinary lighting or power service carried along the same wires. That got rid of the expense of the special overhead wires hitherto used and also removed an interference with the amenities of a town.

The Corporation believed that the establishment of such a service would not only increase sales of electricity to present consumers but that this cheap and convenient method of broadcast reception would attract new consumers. Their proposal, he submitted, was in accordance with the policy of Parliament to encourage the sale of electricity. The Postmaster-General and the B.B.C. were both satisfied, and the Electricity Commissioners looked with favour on the scheme. The Ministry of Health who had also been communicated with suggested that it should be made clear that there would be no charge on the rates and a clause had been agreed with the Ministry to meet that point.

There remained the question of whether the Corporation, having established the station, should itself operate it. It was proposed to take power to lease the rights to a company, and it might be that that would be the best method of working.

Without hearing evidence the chairman said that the Committee would grant the power sought and the Bill was ordered to be reported to the House for third reading.

British Overseas Electrical Trade in April

	Exports. Electrical exports for April, 1933.	Inc. or dec. as compared with Mar., 1933.	Inc. or dec. as compared with April, 1932.	Imports. Electrical imports for April, 1933.	Inc. or dec. as compared with Mar., 1933.	Inc. or dec. as compared with April, 1932.	Re-Exports. Electrical re-exports for April, 1933.	Inc. or dec. as compared with Mar., 1933.	Inc. or dec. as compared with April, 1932.
Insulated wires and cables ...	£94,640	– £3,849	+ £14,904	£13,115	+ £174	– £4,553	£27	– £100	– £577
Electric carbons	1,384	– 179	– 6,014	12,217	+ 2,013	+ 7,756	3	– 10	– 42
Arc lamps and searchlights ...	531	+ 209	– 454	45	+ 13	– 583	14	+ 14	– 85
Incandescent lamps	30,411	– 7,082	+ 1,815	13,802	+ 1,290	+ 5,543	494	– 412	+ 255
Other lighting apparatus ..	20,652	– 3,187	– 5,905	21,959	+ 106	+ 9,005	3,297	+ 716	+ 1,360
Batteries and accumulators ...	50,315	– 5,693	– 17,953	1,565	+ 177	– 1,663	35	– 23	– 1,542
Meters and instruments .	23,009	– 701	– 5,226	19,701	– 5,626	– 1,910	259	– 444	– 158
Unenumerated electrical goods and apparatus	84,057	+ 9,219	– 1,097	29,623	– 5,829	– 11,512	1,892	– 1,820	– 1,877
Telegraph and Telephone Cable and Material—									
Telegraph and telephone wires and cables (not submarine)	14,313	– 4,530	– 16,130	201	– 300	+ 104	—	– 40	—
Submarine telegraph and telephone cables	87	– 3,074	– 674	—	—	—	—	—	—
Telegraph and telephone apparatus	119,199	– 111,068	– 2,901	29,684	– 21,593	– 2,190	754	– 784	– 7,859
Electrical Machinery—									
Railway and tramway motors	3,495	+ 1,474	– 2,436	—	—	—	—	—	—
Other motors and generators	114,006	– 45,204	– 2,520	—	—	—	—	—	—
Unenumerated electrical machinery	132,864	– 21,528	– 149,982	23,248	+ 1,713	– 9,048	1,500	– 3,270	– 5,330
Total	£688,963	– £195,193	– £194,573	£166,160	– £27,862	– £9,051	£8,275	– £6,173	– £16,861
Decrease for the first four months of the year		Exports. £245,572			Imports. £277,334			Re-exports. £39,991	

Business and Industrial Notes

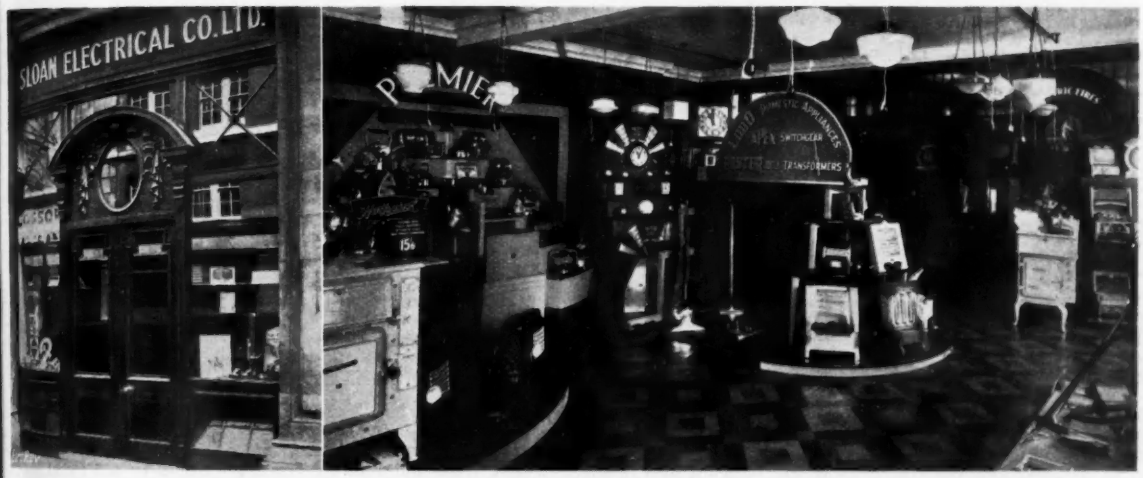
The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Municipal Contracting at East Ham

The East Ham Electricity Committee recently reported that it had received a deputation from local electrical contractors on the question of the assisted wiring scheme, and that the town clerk had submitted a letter from the Electricity Commissioners stating that local contractors had written protesting against the Council's decision that they should no longer be allowed to carry out electrical installations under the assisted wiring scheme. The Commissioners asked to be furnished with the observations of the Council on the matter with special regard to the provisions of Section 48 of the Electricity (Supply) Act, 1926. The committee, having fully considered the observations made by Mr. L. C. Penwill, on behalf of the contractors, recommends that its previous decision to carry out the schemes by the Council's own staff should be adhered to and that the Electricity Commissioners should be informed that the Council is of opinion that the policy adopted is in the best interests of the consumers.

Sloan Electrical Co.'s New Depôt

On Monday the new West End Depôt of the Sloan Electrical Co., Ltd., at 41, Kingsway, W.C.2, was officially opened by the chairman of the company, Mr. L. G. Sloan, J.P., and below are pictures of the new premises. On the ground floor is the trade counter, ample stocks of goods being kept in storerooms in the basement. A feature of the well-equipped showrooms on the second floor is that each class of apparatus is kept separate, thus facilitating comparison of different makes and designs.



Exterior and interior views of the new depôt of the Sloan Electrical Co., Ltd., at 41, Kingsway, London, W.C.2

Electrical Machinery Exports in April

The following figures relate to the exports of electrical machinery from Great Britain during April, notes being made of increases or decreases as compared with the corresponding month of last year :—

	Quantities.		Value.	
	April, 1933.	Inc. or dec. as compared with April, 1932.	April, 1933.	Inc. or dec. as compared with April, 1932.
	Tons.	Tons.	£	£
European countries	488	— 623	97,779	— 58,267
Japan	*	*	380	— 407
South American countries ...	52	— 30	7,886	— 5,500
South and South-West Africa	188	— 356	31,296	— 28,012
British India	255	— 107	34,470	— 18,998
Australia	45	— 80	7,119	— 10,681
New Zealand	133	+ 115	31,697	+ 27,397
Canada	18	— 421	2,380	— 55,748
Other countries	258	+ 78	37,358	+ 5,278
Total	1,437	— 1,464	£250,365	— £154,938

* Not stated.

When studying the figures for electrical import and export trade generally which appear on the opposite page, readers are reminded that there were five Sundays in April as well as the Easter Holidays.

Electricity at the Bath and West Show

At the Bath and West Show, to be held at Wimbledon, from May 24th to 27th, what is stated to be the largest and most comprehensive display yet organised of electrical applications on the farm is being arranged by the British Electrical Development Association, assisted by the County of London Electric Supply Co., Ltd., the Guildford Corporation Electricity Department, the London & Home Counties Joint Electricity Authority, the Metropolitan Electric Supply Co., Ltd., the North Metropolitan Electric Power Supply Co., and the Wimbledon Corporation Electricity Department. The uses of electricity for pumping, chaff-cutting, grinding, crushing and mixing, milking, churning, refrigerating and other purposes will be shown, and practical demonstrations will be given continuously of the applications of electricity on the dairy farm, and to incubation, brooding and other operations on the poultry farm. A large section of the exhibit will be devoted to various domestic labour-saving appliances—electric washers, ironers, cookers, &c.—suitable for use in the farmhouse.

Visit to G.E.C. Works

The Lord Mayor of Birmingham, accompanied by the Lady Mayoress and the aldermen and councillors, last week paid a visit to the Witton Engineering Works of the General Electric Co., Ltd., and were received by Dr. A. H. Railing, director in charge of the works. An interesting demonstration was given in the High Tension Laboratory, where 1,000,000-V apparatus is installed, and particular interest was taken in equipment being manufactured for the Birmingham Electricity Supply Department. Two large turbo-alternator rotors—one of 40,000 kVA for Hams Hall station and the other of 25,000 kVA for Nechells—were in the process of being wound in connection with the frequency change, while other important equipments in the shops included a 12,000-kVA, 33,000-V transformer for Nechells.

After the tour of inspection the visitors were taken to the Magnet Club for tea. Dr. Railing in welcoming the guests referred to the great importance of the electrical industry to Birmingham. The G.E.C., he said, employed 9,000 people in the city, and even at the present time, with industry generally in the state of depression which had temporarily overwhelmed it, the company had responded to the " wise spending " movement by building a new battery works, a new stores, and extensions to existing works necessitating the laying down of plant involving a capital expenditure of over £100,000.

The Exide Service Convention

A feature of the thirteenth annual Exide Convention to be held at Torquay from June 27th to 29th will be a contest among Exide service agents for the best paper on sales problems. Among other events will be the competition for the Exide Golf Challenge Cup, a tennis tournament, and a banquet at the Town Hall Ballroom. The Imperial Hotel will be the Convention headquarters, and it is expected that the record attendance at the Blackpool Convention last year will be exceeded.

Domestic Development in Paris

Our Paris Correspondent says that never before has the domestic side of electricity received so much attention in that city as it is getting to-day. The aim is to make Paris an all-electric city, and the Municipality and distribution company are making great strides in the right direction. In nearly all new buildings electrical service is being provided. During the first three months of this year sixty-five apartment houses were completed, making a total of about 1,500 flats, and all these are fitted with electric kitchens and bathrooms. The Municipality is overcoming the idea that electricity is expen-

sive and the single rooms of its new buildings include electricity with the rent. These rooms are all equipped with 2-kW heaters. In the larger apartments, comprising seven rooms, 7.2-kW cookers have been installed, and in one- or two-roomed apartments there are 2.7-kW cookers. It will thus be seen that electricity is not confined to the large and expensive variety of flats, but also to those paying the lowest rentals.

This, in its turn, is having an influence upon other electrical apparatus, with the result that manufacturers are doing all in their power to increase the sale of refrigerators, clocks, etc., in fact anything which uses electricity.

Pictures on page 705 show how this is being done. For the refrigerator there is a certain domestic touch which will appeal to any woman. The picture of the clock window is also attractive. One thinks of the convenience of not having to wind the clock up, of always being certain that it is right, and, at the same time, that it is a novelty that is not at all expensive.

Flat Flexibles

With reference to the description of a flat flexible which appeared in our May 5th issue (p. 637), Messrs. Ward & Goldstone, Ltd., inform us that they have been making flat type flexible cords for many years, with single, twin and triple conductors in both small and large sizes.

Registered Electrical Contractors

The following applications for registration were accepted by the Executive Committee of the National Register of Electrical Installation Contractors at its last meeting :—

A. L. Austin & Sons, Sunderland.
Allenby & Stokell (Birmingham), Ltd., Birmingham.
T. Hadfield, Heywood.
L. G. Jones & Co., Birmingham.
Storr & Co., Hull.
W. Rutter, Salford.
T. Porter & Co., Salford.
H.P. Electrical Co., Ltd., Salford.
Nibbs & Scott, Portsmouth.
W. Sims, Buxton.
John Pounder, Ltd., West Hartlepool.
G. H. Monson, Hull.
F. B. Chaplin, Bilston, Staffs.
A. T. Spurrell, Pembury, Kent.
Lowden Bros. & Co., Ltd., Dundee.
H. Cartwright, Brierley Hill, Staffs.

At the same meeting four applications were withdrawn and nine were declined.

Belfast Students Visit Lancashire Works

A party of engineering students from the Belfast College of Technology recently visited the works of British Insulated Cables, Ltd., at Prescot. The party, which was in charge of Professor Burns, head of the Electrical Engineering Department of the College, and accompanied by Lieut. Wildy, R.E., on arrival at the works was divided into groups, each being taken charge of by a works guide. At the conclusion of the tour Professor Burns, on behalf of the party, expressed his appreciation to the company. The party then paid a visit to Port Sunlight to view the works of Messrs. Lever Bros. The next morning was spent in visiting the works of the Metropolitan-Vickers Electrical Co., Ltd., Manchester, and the tour was concluded with a visit to the Crossley Motor Works.

Recent Contracts

An order has been placed by the Sydney (N.S.W.) Corporation with the Associated Equipment Co., Ltd., Southall, for two single-deck 34-seater trolley-buses of the six-wheel type. In one case, the chassis only will be shipped so as to give Australian labour the chance of building the body; and in the other the chassis will go out with a body shell only, leaving all the fittings to be incorporated in Australia. The first chassis will have electrical equipment by the English Electric Co., Ltd.; for the electrical side of the second, the British Thomson-Houston Co., Ltd., will be responsible.

Messrs. Blackstone & Co., Ltd., have received a large number of orders for " unchokable " pumps from various municipal and Government authorities, &c., including the Air Ministry, Glasgow Electricity Department, and the London Underground Railways.

Orders recently received by Morris Commercial Cars, Ltd., for commercial vehicles, include one from the Post Office Stores Department for 100 15-cwt. chassis and thirty-five one-ton chassis. This order will increase the number of Morris-Commercial vehicles used by the G.P.O. to 1,410.

Increased Duties on Carbon Rods and Glassware

The Import Duties Advisory Committee gives notice that it has under consideration applications for increased import duties on carbon rods for electric batteries and illuminating glassware, including globes and shades, oil lamp glasses, miners' lamp glasses, glass bulbs and tubes for electric lamps or valves, and glass parts and accessories, whether finished or not, for lamps and all other kinds of illuminant. Any representations which interested parties may desire to make with regard to these applications should be addressed to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, S.W.1, not later than May 29th in the case of carbon rods, and not later than June 8th in the case of glassware.

Walsall Electrical Co., Ltd.

Mr. P. Cozens, liquidator of the above company, informs us that he has sold the business—the manufacturing side as from May 5th, and the wiring contracting department as from May 9th. He will not therefore be responsible for the payment for any further orders given in the name of the company. The purchasers of the manufacturing side of the business will continue to trade at the old address under the name of the Walsall Electrical Co., Ltd., whilst the purchasers of the wiring contracting side will continue to carry on at the old address as The Electrical Contracting Co. The book debts up to May 5th will be collected by Mr. Cozens, who anticipates that he will shortly be able to pay a further dividend to the old creditors.

Trade Announcements

The Major Equipment Co., Ltd., has taken over the entire organisation of Cawdery's Theatre Services, stage constructional and counterweight engineers. The electrical side of the business will remain unaltered.

Mr. Murray Irving, electrical and wireless engineer, 34a, High Street, Deal, has opened a branch establishment at 96, High Street, Ramsgate.

Messrs. Lawton (Successors), Ltd., have taken over the business of Messrs. John Lawton & Sons, Ltd., Sentinel Works, Doris Road, Bordesley Green, Birmingham, and will operate from the same address, and handle the same class of business as before.

Electric Lamp Factors, Ltd., have opened a new branch at 102, Abbey Street, Accrington (telephone No. 2774). The company has recently opened depôts in a number of other important industrial centres. The Accrington depôt will be under the management of Mr. J. McGrath, who is at present branch manager of the Preston and Blackpool depôts.

Australian Duty on Electric Fans

Increased duties on electric fans of the household type are recommended by the Australian Tariff Board, as a result of an application made last year by the Electrical Engineering and Construction Pty., of Melbourne. The Board states that the normal Australian requirements are now 14,000 fans annually, valued at £30,000 in Australian currency. The report adds that the Australian manufacture of electric fans has had the effect of reducing the prices of fans to the public, and the Board considers that the local industry is conducted on a sound basis. It is considered that the success of this industry will materially assist the Australian production of fractional h.p. motors.

Electric Mosquito Traps

Much interest has been shown by our readers in a note appearing in our March 10th issue (page 361) describing a device for catching mosquitoes. Further details in the form of an illustrated brochure in French has just reached us from the inventress, Mlle. Germaine Gourdon, of Montmorency, near Paris.

The Timber Market

Our Timber Trade Correspondent reports that the European wood trade has been rendered uncertain by the embargo on

The novel window display at the Whitchurch showrooms of the Electricity Distribution of North Wales & District, Ltd., has been arranged in connection with a campaign for selling sets of " Helios " domestic appliances

Russian wood, and the stoppage thereby of nearly a third of our European imports this year has had the effect of raising prices on the spot and forward markets. Other producing countries, however, especially Canada, are anxious to sell more to the United Kingdom, although at not such cut-throat prices as the Russian wood, so that the country is not likely to be short. The fall in the value of the dollar has cheapened U.S.A. wood, and is likely to stimulate demand; on the other hand, Empire timbers, Canadian and tropical, are growing in favour, but hardwoods generally are not in any large request.

The New Watford Baths

We have received from the British Electrical Development Association a brochure which it has produced for the Watford Corporation illustrating and describing what are claimed to be the first all-electric baths in England (see last issue, p. 669).

Henley's Works Visit

Over 150 members and friends of the City Livery Club visited the Gravesend works of W. T. Henley's Telegraph Works Co., Ltd., on May 10th. The photograph on the next page was taken before luncheon was served in a large marquee on the lawn. After the loyal toast, Sir Montague Hughman, the new chairman of the company, in proposing "The City Livery Club," briefly outlined "Henley's" history and said that the Gravesend works were started in 1906, as it was found desirable to separate the rubber cable work from the paper-insulated lead-covered cables which were then in strong demand. From the start, the works had been highly successful, and had been extended many times. The guests would also see Henley's Tyre & Rubber Co.'s works, which were adjacent to the other factory. Henley's employed many thousands of hands, and their manufactures went to all parts of the world. The welfare of the men and women employed at the works was thoroughly catered for.

Capt. J. F. C. Bennett, president of the Club, responded to the toast and returned thanks for the company's hospitality, after which a tour of the works occupied the afternoon until tea was served.

All departments of the factory were visited—cable making, research, engineering, wire drawing, and the rubber works in which pneumatic vehicle tyres and golf and tennis balls are made; all appeared to be well occupied. The Engineering Department, in particular, in which distribution equipment and accessories are made, is arranging for a 20 per cent. increase in production, and is busy on recent orders representing considerable cable extensions.

Prince George at Mather & Platt's factory

Prince George, in his capacity of "factory inspector," paid a visit to the Manchester works of Messrs. Mather & Platt, Ltd., on May 10th. In the course of his tour the Prince, who was accompanied by Mr. L. E. Mather (chairman of the company) visited the pump, electrical, textile, food-canning and fire departments. He was particularly interested in the "Mulsifyre" fire-fighting apparatus for extinguishing blazing oil by the use of atomised water, and witnessed two demonstrations of this apparatus. Before leaving the works he was entertained to lunch by the chairman and other directors.

Swedish Delegation Visits Skefko Works

The Swedish Trade Delegation to this country visited the Luton works of the Skefko Ball Bearing Co., Ltd., on May 9th and after luncheon in the directors' room inspected the works and viewed the various departments and processes.

Thorpe & Thorpe, Ltd.

With reference to the paragraph appearing in the ELECTRICAL REVIEW of May 5th (page 645) regarding the winding-up of Messrs. Thorpe & Thorpe, Ltd., we are asked to state that this company, whose offices were at 38, Broad Street, Golden Square, W.1, went into liquidation in 1931. It should not be confused with Messrs. Thorpe & Thorpe, Ltd., of Vincent House, Vincent Square, S.W.1, and Hartley Wintney, Hants, who are actively carrying on business as electrical engineers and contractors. Mr. M. Campbell Jones became a director of the present company when the goodwill, &c., of the original company, with which he had no connection, was taken over; he and Mr. R. G. Sullivan are its directors.

Social Events

The Scottish Electrical Manufacturers' & Factors' Association held its annual golf match at Gleneagles on May 2nd, when representatives of a large number of electrical companies took part in two competitions, one in the morning and the other in the afternoon. The occasion was favoured by fine weather.

The social and sports club of the Pirelli-General Cable Works, Ltd., embraces practically every form of athletic and social activity and its membership ranges from directors to office boys. The Club's football teams have won the Southampton Senior League and cup, and have been well to the fore in other events in the county, while the men's tennis section has won its way to the Hampshire and Isle of Wight senior men's section. The company has helped to make these successes possible by providing extensive playing fields totalling thirty acres, including pavilions.

Prices of Materials

Messrs. F. Smith & Co. report, May 17th: Electrolytic copper bars, £46, £11 15s. inc.; electrolytic copper sheets and wire rods, no change; electrolytic copper h.c. wire, 7¼d., ⅞d. inc.; Silicium bronze wire, 88½d., ⅞d. inc.

Messrs. Edward Till & Co. report, May 17th: India-rubber, Para fine, 4¼d., ½d. inc.

Messrs. James & Shakespeare report, May 17th: Copper bars (best selected), sheet and rod, £65, £2 inc. English pig lead, no change.

New Catalogues and Lists

McLeod & McLeod, Ltd., 329, High Holborn, W.C.2.—Leaflets dealing with "Doelcam" lamps, reflectors, transformers, &c.

Electrical Equipment & Carbon Co., Ltd., 107/111, New Oxford Street, W.C.1.—A list (No. K.P.8) of special fittings and accessories for overhead line transmission.

Hart Accumulator Co., Ltd., Marshgate Lane, Stratford, E.15.—An illustrated brochure (No. 243) on "Keepalite" emergency lighting equipment for cinemas, theatres, hospitals, &c.

L. G. Hawkins & Co., Ltd., 30/35, Drury Lane, W.C.2.—The May issue of the "Link," announcing further new "Supreme" lines—wash boilers, sewing machine motors, vacuum cleaners, and magnifying mirrors. Also leaflets relating to the "Universal De Luxe" vacuum cleaners and Pye model "Q/MT" battery transportable radio receivers.

B.E.N. Patents, Ltd., 92, Tottenham Court Road, W.1.—List No. CB.22 dealing with compressed-air fittings and connections. Also the May "B.E.N. Bulletin."

E. J. Wilcock, Ltd., Cowper Street, Summer Lane, Birmingham.—A folder relating to the company's maintenance and repair service, for motors and other industrial electrical equipment.

A novel Revo instruction card. The clock serves as a reminder when to remove food from the oven or hot plate

Ward & Goldstone, Ltd., Frederick Road, Pendleton, Manchester.—A list (No. B/2331 OT), of "Bakelite" electrical components, and a pamphlet dealing with the company's "Twylite" dimming switch.

F. C. Heayberd & Co., 10, Finsbury Street, E.C.2. — Leaflets relating to new portable battery chargers and auto-transformers.

Revo Electric Co., Ltd., Britannia Works, Tividale, Tipton, Staffs.—A new Revo recipe book and a novel instruction card. Also a 184-page illustrated catalogue of electric lighting equipment.

Ateliers de Constructions Electriques de Charleroi, 56, Victoria Street, S.W.1.—The May stock list of motors, generators, centrifugal pumps, &c.

Steel Band Conveyor & Engineering Co., Ltd., Barker Street Works, Parade, Birmingham.—A folder containing views of typical installations of steel band conveyors.

F. V. Williams & Co., 170, Westminster Bridge Road, S.E.1.—A leaflet on new and reconditioned motors (1/100 to 50 b.h.p.), for all industrial purposes.

Edison Swan Electric Co., Ltd., 123-125, Queen Victoria Street, E.C.4.—A folder illustrating "Ediswan" bowl and other small fires.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.—A folder entitled "Manufacture and Supplies" (No. 372), giving a list of 141 Henley products—wires, cables, flexible cords, jointing and overhead line materials, and electrical distribution equipment. Also catalogues U.F.2 and W.L.6 referring to "Holborn" pavement frames and covers, and "Isco" insulated service cutouts.

F.W.F. & Co., Brock Street, Lancaster.—A leaflet describing an a.c. battery charger incorporating a self-regulating current choke.

Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4.—Leaflet No. 450/0, illustrating and describing a lift car or reversing master switch. Also publication No. 1035B., dealing with automatic star-delta starters for three-phase squirrel-cage motors.

Stothert & Pitt, Ltd., Bath.—Publication No. F/14, relating to rotary displacement pumps for land service.

S. Wolf & Co., Ltd., 115, Southwark Street, S.E.1.—A booklet dealing with portable electric tools, with notes on design and maintenance.

Johnson & Phillips, Ltd., Charlton, S.E.7.—Publication No. H.D.1, describing the new "Charlton" electric storage water heater.

British Vacuum Cleaner & Engineering Co., Ltd., London, S.W.6.—A novelty folder entitled "The Invention of the Brush."

Horstmann Gear Co., Ltd., Newbridge Works, Bath.—A new edition of the "Newbridge" time-switch catalogue.

Newtons of Taunton, Ltd., 319, Regent Street, W.1.—A catalogue dealing with "Rotax" electric tools, and a leaflet on automatic air compressors.

McMichael Radio, Ltd., Slough.—The May number of the "McMichael Messenger" containing a useful sales article entitled "Prepare for the West Regional."

Cambridge Instrument Co., Ltd., 45, Grosvenor Place, S.W.1.—A circular illustrating and describing a new Cambridge thermograph for flush or wall mounting.

Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.1.—Particulars of a new sales aid—a name plate for radio receivers inscribed with the dealer's name and bearing the slogan "Replace with Marconi Valves."

London Electric Wire Co. & Smiths, Ltd., Playhouse Yard, Golden Lane, E.C.1.—A booklet giving details of a new range of fire-resisting cables and flexibles.

Bankruptcy Proceedings

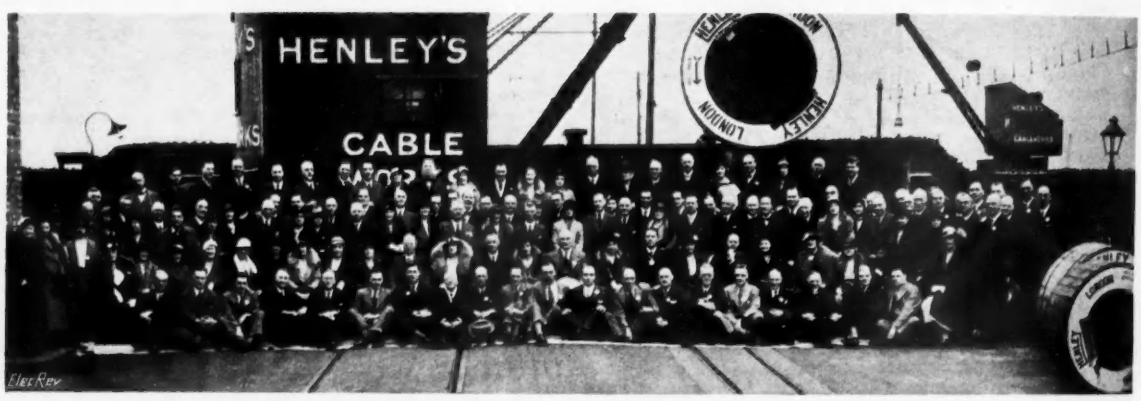
E. Whitehouse, electrical and radio engineer, 29, Westfield Street, St. Helens, Lancs.—This debtor filed his own petition recently, and according to the statement of affairs lodged the gross liabilities amount to £3,043, of which £2,241 is expected to rank for dividend, whilst the net assets amount to £517, leaving a deficiency of £1,724. He attributes his failure to lack of capital and the heavy overhead charges of the business. At the first meeting of creditors held recently Mr. P. S. Booth, of

2, Bixteth Street, Liverpool, was appointed trustee, with a committee of inspection. The following are the principal creditors: Beadle & Co., Ltd., £133; Baxendale & Co., Ltd., £240; Columbia Graphophone Co., Ltd., £124; S. Hathaway & Co., Ltd., £120; H. Hollingdrake & Son, Ltd., £235; Marconiphone Co., Ltd., £132; Philco Distributors (Lancs), Ltd., £155; J. Whitehouse, £234; W. Whitehouse, £245.

B. Glassman, wireless goods dealer, 2, Hillcrest Avenue, Golders Green, N.W.—The public examination of this debtor was held on May 11th at the London Bankruptcy Court, the accounts showing total liabilities of £2,406 (ranking £1,194) and assets of £13. The debtor stated that since June, 1930, he had carried on business as dealer in wireless goods, after November, 1931, under the style of "Alfa Radio Co.," at the above address, and also at 104, Chamberlayne Road, Kensal Rise. In November, 1931, he and his wife formed "Direct Sales, Ltd.," but it was not a success and ceased to trade in June, 1932. His own business also declined. He attributed his insolvency to inability to recover moneys owing by "Direct Sales, Ltd.," to his liability under a guarantee given on that company's behalf, general trade depression, and to losses caused by fall in prices. The examination was concluded.

S. J. Garrod (trading as "The Electrical Repair & Manufacturing Co."), 181, St. John Street, E.C.—This debtor attended at the London Bankruptcy Court on May 11th for public examination, the accounts showing total liabilities of £2,499 (ranking £1,867) and net assets of £803. Replying to Mr. Cresswell, Assistant Receiver, the debtor said he began the above business in June, 1920, with £50 capital and traded in succession at Goswell Road and St. John Street, E.C. Since 1930 he had also traded under management as the "Gar Wood Manufacturing Co." That concern was unsuccessful throughout, and an execution having been levied in January last he ceased trading and filed his petition. The failure was attributed to the gross profits having been insufficient to cover overhead expenses. The examination was concluded.

R. W. Brown (trading as "The North Side Radio"), radio salesman and engineer, 72, Promenade, Bridlington, Yorkshire.—The first meeting of creditors was held on May 10th at the Official Receiver's office, Bank Chambers, Scarborough. A statement of affairs had been lodged which showed gross liabilities of £232, of which £185 was expected to rank for dividend. The assets were estimated to realise £101, so that there was a deficiency of £85. Debtor attributed his failure to "fall in prices of stock, being unable to sell goods on hire-purchase terms, and severe competition." The case being a summary one was left in the hands of the Official Receiver, as trustee.



Members and friends of the City Livery Club at Henley's Gravesend Works (See page 715)

H. A. Langlois (trading as the Electrical Installation Co., and the Electrical Contracting Co.), electrical contractor, 2, Atlas Place, Cardiff; 22, Pocklingtons Walk, Leicester; 94, Rutland Street, Leicester, and Gartree Street, Leicester.—The public examination took place at the Law Courts, Cardiff, on May 5th. According to the statement of affairs lodged the ranking liabilities totalled £2,294, and the assets were estimated to realise £396, leaving a deficiency of £1,897. Debtor said that his failure was partly due to the fact that he had been unable to join the trade association. The examination was adjourned to allow debtor's cash accounts to be investigated.

C. I. Bentley (trading as "Traders' Electric Lighting Supply"), electrical factor, 9, Fish Street, Hull.—The first meeting of creditors was held at the Official Receiver's office, 1, Parliament Street, Hull, on May 9th, when it was stated that the liabilities amounted to £209, and the assets were estimated to realise £29, leaving a deficiency of £180. Debtor attributed his failure to bad trade, bad debts and heavy market expenses. The matter was left in the hands of the Official Receiver, as trustee.

H. H. Edwards, formerly electrical engineer, 26, Churchfields, Wellington, Somerset.—The public examination took place recently at the Municipal Buildings, Taunton. A statement of affairs had been prepared which disclosed gross liabilities of £179 and assets estimated at £80. The failure was attributed to anticipated contracts not materialising, and slackness of trade. The examination was closed.

F. J. Woolfenden and **J. D. Lister,** electrical and radio engineers, 56, Victoria Street, Littleborough.—Receiving order made May 5th on debtors' own petition. Public examination, June 2nd, at the County Court Buildings, Rochdale.

J. Mellanby, electrical engineer, Mystery House, Cambridge Road, Waterbeach.—Public examination, June 14th, at the Guildhall, Cambridge.

H. Cavanagh, electrician, 19, Hampden Street, Salford, and at Prestwich.—Trustee, Mr. F. Murgatroyd, Byrom Street, Manchester, Senior Official Receiver, released April 24th.

F. Lockett, electrical dealer, 45A, Parrs Wood Road, Didsbury, Manchester.—First and final dividend of 10d. in the £, payable May 19th, at the Official Receiver's offices, Byrom Street, Manchester.

I. L. Lawrence, electrician, 11, Grand Parade, Brighton.—Receiving order made May 9th on debtor's own petition.

C. A. Brown, wireless and electrical engineer, 36, Leagrave Road, Luton.—First and final dividend of 1s. 6d. in the £ payable May 26th at Kimberley House, Holborn Viaduct, E.C.

Company Liquidations

British Ensign Engineering Co., Ltd.—Particulars of claims by May 31st to the liquidator, Mr. H. Kidson, 45, Kingsway, W.C.

Kenneth Brooks (Radio & Television), Ltd.—Winding up voluntarily. Liquidator, Mr. G. C. Jarvis, 115-117, Cannon Street, E.C.4.

Private Arrangements

L. Benn & Co., Ltd., electrical importers, Colonial Avenue, Minories, London, E.C.—A meeting of creditors was held recently at Winchester House, Old Broad Street, E.C. A statement of affairs disclosed liabilities of £14,151 and total assets of £3,620, from which had to be deducted debenture and interest amounting to £1,218, leaving net assets of £2,402, or a deficiency as regarded creditors of £11,749. There was a contingent liability in respect of goods ordered but not yet delivered amounting to about £1,000. Mr. S. Teff, solicitor, said that although the business had made satisfactory profits for a number of years, during 1932 bad debts had been incurred and that had contributed to some extent to the present position. The company had made purchases from Belgium and Germany, and when this country departed from the gold standard, losses were incurred in the re-sale of those goods. During last year drastic reorganisations were made, involving additional advertising, and accordingly the expenses were increased. The directors considered that if the creditors would allow the business to be carried on it could be continued successfully, and they (the directors) submitted an offer of 5s. in the £, payable by three instalments, the first to be paid as soon as all creditors had assented to the arrangements, and the balance at three and six months. Eventually it was decided to appoint a committee of inspection consisting of the representatives of five of the creditors to look into the matter further and report. The following are the principal creditors: Geo. Becker, £461; Direct Electric Lamp Co., Ltd., £2,380; Electric Lamp Service, £652; Ensign, £642; Insular Electric Glowlamp Works, £588; Mitsubishi Shoji Kaisha, £916; Meteor Lamp Co., £207; Nivalight, £2,052; O. Trading Co., £219; Christopher Palmer, £205; Sassoon, £339; Wallisch, £280.

G. Kalis, wireless, electrical and accumulator dealer, trading as London Bridge Wireless Supplies, 40, King William Street, E.C.4, Andys Radio Stores, and as the "Bulldog" Accumulator Co., 285, Edgware Road, W.2.—A meeting of creditors was held on May 2nd at the offices of Messrs. Philip Mordant, Jarvis and Co., Cannon Street, E.C., when the representative of the Radio Trading Co., the principal trade creditors, presided. Mr. Jarvis submitted a statement of affairs which disclosed liabilities of £3,718, all due to unsecured creditors, and assets totalling £1,265, from which had to be deducted preferential claims of £455, leaving net assets of £810, or a deficiency of £2,908. Dealing with the deficiency, Mr. Jarvis said there was a loss on trading from January 1st, 1932, to April 29th, 1933, of £1,200, and it would appear that to a large extent the losses incurred were due to the accumulator business. A resolution was passed that the debtor should execute a deed of composition and assignment to secure the payment of 10s. in the £, payable by five equal instalments, the last instalment to be paid not later than January, 1935. Mr. W. A. J. Osborne and Mr. Jarvis were appointed joint trustees with a committee of inspection consisting of the representatives of the Radio Trading Co., V. Zeitlin & Sons, Ltd., Pearl & Pearl, Amplion (1932), Ltd., and Lissen, Ltd.

J. J. Fox, electrical dealer, &c., 45, Broadway, and 20/21, Dovecot Place, Knotty Ash, Liverpool.—At a recent meeting of creditors, a balance sheet was submitted which showed liabilities of £1,204, all due to creditors, and assets totalling £1,395, leaving a surplus of £191. The opinion was expressed that the debtor should be given an opportunity of continuing the business and it was decided that a deed of assignment should be executed to Mr. P. S. Booth, 2, Bixteth Street, Liverpool, with a committee. The trustee was empowered to carry on the business and within a reasonable time to report to the committee in order that it might decide whether there was a reasonable prospect of the business being continued successfully. The principal creditors are: Dulcetto Polyphon, Ltd., £65; Brown Bros., Ltd., £223; General Electric Co., Ltd., £63; Kolster Brandes, Ltd., £75.

Electricity Supply

Lighting, Domestic, Power

Abernethy.—OVERHEAD LINES.—The Grampian Electricity Supply Co. has applied for permission to erect an overhead h.p. cable from Abernethy to Rhynd, over the River Earn.

Arbroath.—ELECTRICITY CHARGES.—A meeting is being arranged between the Town Council and the directors of Arbroath Electric Light & Power Co., Ltd., to consider the question of electricity charges.

Bath.—EXTENSIONS.—The City Council is to expend £4,425 on increasing the plant capacity of various sub-stations, £175 on the erection of a sub-station in Kipling Avenue, and £785 on sub-station equipment at the new offices and showroom.

Batley.—MAINS AND SERVICES.—The Town Council has applied for sanction to a loan of £10,000 for mains and services.

Bebington.—PROTEST AGAINST CHARGES.—The Council has decided to protest again against the Birkenhead Corporation's charge of 5d. per kWh for electricity for lighting purposes.

Bedworth.—ELECTRICITY CHARGES.—The Urban District Council has decided to approach the Leicestershire & Warwickshire Electric Power Co., requesting a reduction in the price for electricity supplied to the town.

Bentham.—TRANSFER OF UNDERTAKING.—The plant and goodwill of the Bentham Electricity Supply Co. has been taken over by the Settle & District Electricity Supply Co., Ltd.

Bromley.—MAINS EXTENSIONS.—The Electricity Committee has decided to lay mains in Warner Road (£114), Addison Road (£96), Hilldrop Road (£35), and at Blackbrook Estate, Bickley (£1,937).

Burton-on-Trent.—REPLACEMENT OF MAINS.—The Electricity Committee is to replace the mains in Alexandra Road, which were laid thirty years ago, at a cost of £900.

Bury St. Edmund's.—MAINS EXTENSIONS.—The Town Council has decided to have distributing mains laid in Whiting Street, Hospital Road, Westley Road, and Highbury Crescent at a cost of £1,967.

Canada.—OPPOSITION TO EXPORT OF POWER.—*The Times* states that the Dominion Government was absolutely opposed to the export of hydro-electric power to the United States when licence was sought to export 300,000 h.p. from Quebec, where there is a surplus at Beauharnois and other places owing to the depression. The Quebec Government recently passed legislation reversing its former policy and permitting export of hydro-electric power, but Federal policy is unchanged. Mr. Bennett has decided that, if American industries need Canadian electrical power, they must establish themselves in Canada.

THE ABITIBI CANYON DEVELOPMENT.—The formal taking over by the Ontario Hydro-Electric Power Commission of the properties, assets and development work of the Abitibi Canyon from the Ontario Service Power Commission, which was unable to carry out its agreements financially, has now been completed. The Hydro-Electric Commission will proceed with the development scheme, and will make available 100,000 h.p., a supply of power having already been provided for the Sudbury district and throughout the north. Additional power will be developed as conditions require, the ultimate capacity of the plant being 250,000 h.p.

Canterbury.—SPECIAL ORDER REFUSED.—The application of the City Council for a Special Order to include in its area of supply parishes in the rural district has been refused by the Electricity Commissioners. At a recent inquiry there was considerable opposition on the part of the county and rural authorities.

Cardiff.—BONUS TO CONSUMERS.—With reference to the paragraph appearing in our issue of May 5th regarding the discount of 10 per cent. on electricity accounts, Mr. C. G. Morley New, the city electrical engineer, points out that this is not a discount subject to payment within a specific time, but is a temporary bonus granted to all consumers, both industrial, business, and domestic, in respect of the September quarter's accounts (1933) only. The restriction as to the time limit for payment of accounts within twenty-one days has been withdrawn, and the bonus will apply therefore irrespective of the date when the electricity accounts for the quarter in question are paid.

YEAR'S WORKING.—According to preliminary statistics, sales of electricity during the year ended March 31st last were estimated to reach over 50,000,000 kWh, an increase of approximately 6.4 per cent. over the previous year. The maximum load on the power station was 21,500 kW, an increase of 700 kW. Despite tariff reductions made last June to a value of £13,000 in a full year, the revenue is expected to reach £287,500, or within £1,000 of that for the previous year. The increased output of 3,395,662 kWh was met without extra cost, due to improved operation, the total quantity of coal used being practically the same, the coal per kWh being reduced by about 5.6 per cent. The number of consumers increased by 3,016 to a total of 42,056, while connections rose by 11,062 kW, of which 7,974 kW was for heating supplies.

COOKER HIRING CONDITIONS.—Conditions for the hiring of cookers have been modified as follows: (a) Tenants are to be allowed free circuits, subject to signing an agreement for five years; and (b) owners of premises are not to be allowed free circuits where required for the use of sub-tenants only, the owner having other means of cooking.

CHANGE-OVER.—The Custom House and Hope Street area is to be changed over from d.c. to a.c. at a cost of £1,250.

MAINS EXTENSIONS.—Mains extensions costing £2,250 are to be carried out.

Croydon.—COOLING TOWER SCHEME.—The Electricity Committee has prepared a revised scheme for the erection of a concrete cooling tower costing £30,920.

LOANS SANCTIONED.—Sanction has been received to the borrowing of £6,000 for meters and £4,176 for mains and plant.

MAINS EXTENSIONS.—Mains extensions are to be carried out in various areas at a cost of £6,605.

Colchester.—THE NAYLAND UNDERTAKING.—Reporting on interviews with the Electricity Commissioners and the proprietor of the Nayland Electric Light & Power Co., the town clerk stated at a recent meeting of the Electricity Committee that, as had been suggested, the proprietor would, in the first instance, approach the East Anglian Electric Supply Co., Ltd., with reference to obtaining a supply of electricity for his undertaking.

SUPPLY TO ST. OSYTH.—The Electricity Committee has been informed that the Clacton Urban District Council is not prepared to consent to the granting of a Fringe Order to the Corporation and is taking steps to supply premises at St. Osyth within its authorised area of supply.

LOANS SANCTIONED.—Sanction has been obtained to the borrowing of £3,000 for sub-station plant and £2,000 for a transformer and switchgear for the power station.

EXTENSIONS.—L.p. distribution is to be carried out in Wivenhoe (£232) and Ramsey (£160).

Dorchester.—SUPPLY FOR RAILWAY.—The Town Council has agreed to give a supply of electricity to the Southern Railway at a standing charge of £12 per kW., plus 2d. per kWh consumed for all purposes.

MAINS EXTENSIONS.—Mains extensions sanctioned include one to supply houses being erected in London Road and Tubbs Road, and a confectionery factory in the latter thoroughfare.

Dymchurch.—A SUPPLY NOW AVAILABLE.—Electricity has now been made available by the Folkestone Electricity Supply Co., Ltd. The overhead lines are to be extended to Jesson, New Romney, Littlestone, Greatstone Dunes and Lydd.

East Ham.—MAINS AND SERVICES.—The Electricity Committee has obtained sanction to a loan of £6,174 for mains extensions, and has applied for permission to borrow £30,000 for house services.

Gainsborough.—CHEAPER ELECTRICITY.—The Urban District Council has reduced electricity charges as follows:—Lighting flat rate, from a sliding scale of from 6d. to 4¾ to 4½d. for any quantity; two-part tariff for business premises, primary charge from 7½d. to 7d. The primary charge (1½d.) of the two-part tariff for domestic premises now applies only to the first 50 kWh (instead of 200 kWh), the remainder being charged for at 1d. per kWh. The charge for power has been revised from 3d. per kWh for the first 90 kWh per quarter per h.p. installed to 3d. per kWh for the first 80 kWh. Meter rents are also reduced.

Glasgow.—MAINS EXTENSIONS.—The Electricity Committee is to lay distributing mains at a cost of £5,083.

PRICE REDUCTIONS APPROVED.—The Corporation has approved the proposal of the Electricity Committee to reduce electricity charges, involving a saving of £220,000 to consumers.

Great Yarmouth.—UNDERGROUND MAINS.—The Town Council has received sanction to a loan of £3,497 for underground mains, being portion of £4,872 required for the laying of additional feeder cables from Barnard Avenue to Caister, and from Ferry Hill to the Hopton sub-station.

Hastings.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains to supply Hoads Wood and St. Helen's Down Roads (£1,157), and Manchester Road, Ninfield (£560).

High Wycombe.—ELECTRICITY CHARGES.—The Rural District Council has decided to apply to the Minister of Transport for a reduction in the maximum charge for electricity by the Cookham & District Electricity Corporation, Ltd. The Commissioners had informed the Council that the company had told them that the recent reduction of the flat rate of 9½d. per kWh corresponded with the price charged in neighbouring areas served by the Wessex Electricity Co., while the two-part tariff offered was the same as that which the Wessex and High Wycombe companies had in force.

Hoylake.—SPECIAL ORDER.—The Urban District Council is to apply for a Special Order to take over the electricity supply in the new parishes added to the urban area, which include Greasby, Frankby, and Saughall Massie, which were previously supplied by the Birkenhead Corporation. It has also been decided to provide for the transfer of the supply previously undertaken by the Caldy Manor Estate Co.

Inverness.—ASYLUM TO GENERATE OWN SUPPLY.—At a meeting last Friday the Inverness District Asylum Joint Committee approved a recommendation to proceed with a scheme whereby electricity will be generated at the asylum in preference to an offer by the Town Council to supply power at a cost of £240 per annum, plus 1¾d. per kWh. It was agreed, however, that if another offer was put forward by the Town Council it should be considered.

Kenilworth.—A PETITION AGAINST CHARGES.—A petition from tradesmen is to be submitted to the Ministry of Transport, urging that electricity charges in Kenilworth should compare more favourably with those at Coventry.

Kilmarnock.—CONSTITUTION OF AYRSHIRE BOARD.—In the minutes submitted to a recent meeting of the Town Council, reference was made to the fact that the county clerk had included in his memorandum of matters proposed to be dealt with in a Provisional Order the adjustment of the constitution of the Ayrshire Electricity Board. The special committee on the proposed burgh extension recommended that the Town Council should strenuously oppose any alteration in the constitution of the Board, and particularly any suggestion that such a matter should be included in the proposed Provisional Order. The Town Council has approved the recommendation.

Largs.—ILLUMINATION SCHEME APPROVED.—The Town Council has decided to put into operation a permanent scheme of illuminations this summer.

Leicestershire and Warwickshire.—RURAL SUPPLIES.—The Leicestershire and Warwickshire Electric Power Co. has announced that it is taking all possible steps to make electricity available in all villages in its area as soon as it is economically possible. This statement is made in response to a protest from South Warwickshire villages that there has been undue delay in providing supplies.

Lichfield.—NEW DISCOUNT RATES.—The Electricity Committee has approved the following new scales of discount for electricity supplies:—Consumption over 50 and under 100 kWh per quarter, 2½ per cent.; 100 to 200 kWh, 5 per cent.; 200 to 300 kWh, 7½ per cent.; 300 to 500 kWh, 10 per cent.; 500 to 750 kWh, 12½ per cent.; 750 to 1,000 kWh, 15 per cent.; over 1,000 kWh, 20 per cent.

Liverpool.—FURTHER CONCESSIONS.—Users of large heating and cooking installations in Liverpool have just received a further concession from the Electric Power and Lighting Committee. It has been decided that the charge of £16 per kW per annum, plus ¼d. per kWh, shall be reduced to £14 per kW and ¼d. per kWh up to 20,000 kWh a quarter; for consumption over 20,000 kWh the charge will be 0.4d. per kWh. It has also been decided to revise the terms and conditions to consumers taking h.p. supplies under special agreements, and to introduce a power-factor charge in lieu of the present load-factor charge.

THE CHANGE-OVER SCHEME.—It is proposed to apply for sanction to a loan of £200,000 for work in connection with the Corporation's scheme for changing over the supply system from d.c. to a.c.

London.—CAMBERWELL.—The Housing Committee has made arrangements with the County of London Electricity Supply Co., Ltd., to provide electricity on the Sunray and Grove Vale estates. Tenants on the Newlands Estate have now sought similar facilities, and the company is to be invited to afford supplies provided that no cost falls on the Council.

LEWISHAM.—The Highways Committee proposes to accept an offer of the South Metropolitan Electric Light & Power Co., Ltd., to erect an experimental system of improved street lighting.

SOUTHWARK.—The Electricity Committee is to arrange for free-wiring facilities costing £1,260 in Hodson Street and Hurlbutt Place, where there are some 200 tenements.

In the past it has been customary, when carrying out the free wiring of large blocks of tenement dwellings, for the Electricity Committee to enter into an agreement not only with the consumers, but also with the owners of such dwellings. The Committee now proposes that the Council should dispense with the agreement with owners, subject to their consenting to the work being carried out on their premises.

Manchester.—ANOTHER RECORD.—A record output of 421.4 million kWh from the Barton power station is reported for the year ended March 31st last; this compares with 397.2 million kWh in 1931-32. New connections during March amounted to 12,238 kW, bringing the total up to 541,318 kW, while applications for supplies (including additional supplies) numbered 2,407, representing a total of 4,633 kW. There were 183 new cookers connected in March, bringing the total on circuit to 11,191, and orders for the hire of cookers amounted to 248. Hired wash-boilers now number 420, of which twenty were connected during the month.

Margate.—ELECTRICITY CHARGES.—The Town Council, after corresponding with its advisor, Mr. F. W. Purse, and Mr. T. Stevens, on behalf of the Isle of Thanet Electric Supply Co., Ltd., has decided to apply to the Ministry of Transport for a reduction in the maximum price to consumers of electricity. The company insists in retaining the matter of the extension of the tenure of the Order as a factor in the negotiations, and the Corporation Electric & Street Lighting Committee still hopes for an amicable settlement without the need for a Government inquiry.

Minehead.—SUPPLY COMPANY'S PROGRESS.—An increase of 24 per cent. in the sale of electricity in the West Somerset district covered by the Minehead Electric Supply Co., Ltd., was reported at the annual meeting. It was stated that the development of the domestic load and the increased number of consumers taking supplies on the two-part tariff system of charges largely accounted for the expansion. Good progress had been made with the erection of the grid line between Bridgwater and Williton, and the new source of supply was expected to be available by the end of September.

Oxford.—REDUCED CHARGES.—The City Council is to bring into force next October a reduced tariff for domestic and business premises.

THE CHANGE-OVER.—It is hoped that the change-over from d.c. to a.c. will be completed by the end of the summer.

Paisley.—THE ASSISTED-WIRING SCHEME.—The Corporation has referred back to the Electricity Committee for further consideration a proposal that payments under the assisted-wiring scheme should cease after ten years.

Plymouth.—WIRING CHARGES.—The local registered contractors are prepared to reduce the existing charges for wiring from 16s. 3d. to 15s. 9d. per point, and from 15s. to 14s. 9d. for plugs. The Electricity Committee has agreed to these terms for twelve months, when the position will again be reviewed.

Portsmouth.—SUPPLY TO WICKHAM.—The Electricity Committee recommends the extension of the supply to Wickham, where there are some 300 premises, at an estimated cost of £3,600.

NIGHT HEATING CHARGES.—Electricity for heating purposes between 10 p.m. to 7 a.m. is to be charged for at 0.33d. per kWh.

Rawtenstall.—ELECTRICITY FOR DUNNOCKSHAW AREA.—The Electricity Committee has obtained the consent of the Burnley Rural District Council to its application for a Fringe Order in respect of the Dunnockshaw area.

Redcar.—ILLUMINATION SCHEME.—The electrical illumination of Redcar is to be extended at a cost of £1,500.

Scarborough.—LOAN SANCTIONED.—The Electricity Committee has received sanction to the borrowing of £3,124 in connection with the laying of inter-connecting feeder cables between Northstead Estate and Cross Lane.

Shrewsbury.—LOAN PROPOSAL REJECTED.—The Corporation has rejected a proposal to approach the Electricity Commissioners with a view to obtaining a loan of up to £50,000, "for the express purpose of achieving that very desirable objective, namely, the laying of supply cables to every part of the borough and greater Shrewsbury."

Spalding.—ELECTRICITY CHARGES.—The Urban District Council has decided to charge 1d. per kWh for electricity for cooking and heating between March 25th to September 25th, and the electrical engineer is to submit a revised list of tariffs for all purposes.

UNDERTAKING PURCHASE OFFER REJECTED.—The Council has decided to reject a revised offer for the purchase of the electricity undertaking.

Sunderland.—SUB-STATION EQUIPMENT.—The Town Council has decided to provide switch and metering gear for the sub-station to be erected on the new Deep Water Quay at a cost of £1,298.

Swansea.—THE TIR JOHN NORTH STATION.—Sir Andrew Duncan was to perform the ceremony of laying the foundation-stone of the Corporation's new station yesterday (Thursday).

ELECTRIC PUBLIC LIGHTING AT GLAIS.—The Electricity Committee recommends the conversion of the public lighting system at Glais and Birchgrove from overhead to underground wiring at a cost of £672.

Swindon.—MAINS AND SERVICES.—The Corporation Electricity Committee has obtained sanction to the borrowing of £45,000 for mains and services.

Tiverton.—FUTURE SUPPLIES.—The Lighting Committee has under consideration the question of obtaining further generating plant or a bulk supply of electricity.

Torquay.—REDUCED CHARGES ASKED FOR.—The Chamber of Commerce has decided to ask the Town Council to receive a deputation on the subject of electricity charges for shop-window, outside display, factory, stores and workshop lighting.

Tutbury.—PROTEST AGAINST ELECTRICITY CHARGES.—The Rural District Council is to approach the Burton-on-Trent Corporation with a view to reducing the cost of electricity to those users who are paying a 1d. per kWh more than consumers in the borough.

Uttoxeter.—ELECTRICITY FOR ROCESTER.—The Urban District Council has received permission from the Minister of Transport to erect overhead lines to Rocester, and also the sanction of the Electricity Commissioners to a loan of £17,070 in respect of the rural supply.

Wolverhampton.—EXTENSIONS.—The Electricity Committee is to lay an additional feeder cable from Chapel Ash sub-station to Merrivale Road sub-station and extend switchgear at a cost of £2,000. Improvements in the distribution system in the Penn, Merry Hill, and Bradmore transferred areas are also to be carried out at a cost of £13,172.

LOAN.—Sanction is being sought to the borrowing of £25,000 for services, £15,000 for meters, and £26,000 for wiring installations.

Traction

Birmingham.—NEW TROLLEY-BUSES.—The contracts have now been placed by the City Council for fifty trolley-buses, and a commencement will be made without delay on the conversion of the Coventry Road tram route to trolley-bus operation. It is expected that the work will be completed by the end of November.

Germany.—A NEW TRACTION SYSTEM.—The Reich Railway authorities have decided to electrify various lines in South Germany, including the Hollental line, which has gradients of up to one in eleven. It is proposed to supply the overhead conductor directly with a.c., which is to be transformed into d.c. by means of a convertor on the locomotive itself. Herr Wechmann, one of the directors of the Reich railway, is stated to have largely contributed towards the practical application of the method, which does away with the expense of providing transformer stations.

Glasgow.—ALL-ELECTRIC SIGNALLING.—On Sunday tests were carried out on the new system of all-electric signalling at St. Enoch Station, Glasgow. The installation, the first of its kind on any Scottish railway, was carried out by the Westinghouse Brake & Saxby Signal Co., Ltd., and its estimated cost is £120,000. Work on the apparatus has been in progress for two years.

Leigh.—TROLLEY-BUS SCHEME APPROVED.—The Town Council has approved the South Lancashire Transport Co.'s scheme for converting the Orchard Lane-Spinning Jenny Street tram route to trolley-bus operation.

London.—MORE TRAFFIC LIGHTS.—The City of London Police Committee proposes to install traffic lights at Holborn Circus (including Hatton Garden and Charterhouse Street), Newgate Street, St. Martin's-le-Grand, Cheapside, St. Paul's Churchyard, and the Mansion House Station area, which includes Queen Victoria Street, Queen Street, and Cannon Street. It is also proposed to convert the hand-controlled traffic signals at Ludgate Circus to the "Electromatic" system. The estimated cost of the work is not to exceed £6,250, together with an annual charge for maintenance and electricity of £335. Cambridge Circus, W.; Great Charlotte Street, Blackfriars Road; Trinity Street, Borough High Street; and Albany Road, Camberwell Road, are other places at which automatic signals are to be installed.

PETITION URGES RAILWAY ELECTRIFICATION.—A petition, protesting against the "deplorable" traffic conditions in North London and South Hertfordshire, and urging the electrification of the London & North-Eastern Railway lines which serve the areas, and the extension of the Highgate tube to the Highgate L.N.E.R. station, is to be presented to the Minister of Transport by the Councils of Hornsey, Hendon, Barnet, East Barnet, Finchley, Friern Barnet and Wood Green, and the North London joint committee of the Federation of Ratepayers' Associations of Middlesex.

THE L.C.C. TRAMWAY ESTIMATES.—Since the L.C.C. tramway undertaking will be taken over by the London Passenger Transport Board on July 1st, the Highways Committee, in its annual estimates, has provided only for expenditure during the quarter ending June 30th. The amount to be voted on capital account is £56,245, chiefly in respect of the completion of works in progress; this total includes £30,000 for new plant at the Greenwich power station and £15,595 for permanent-way works. The total capital expenditure up to March 31st last was approximately £19,139,893, and the amount of debt incurred £19,549,944. After allowing £11,455,607 for debt repaid and sinking fund balances, the net debt at March 31st is estimated at £8,094,337. It was originally anticipated that there would be a net surplus of £1,420 for the year 1932-33; this estimate was based on an anticipated passenger traffic revenue of £4,210,000. The receipts shown in the revised estimates are £4,045,000, making a deficiency of £80,790. The actual receipts are now ascertained to have been approximately £4,035,135, but, owing to reductions in expenditure, the net result is expected to be a reduced deficiency. It is estimated that total receipts for the three months ending June 30th will be £1,039,530, and that there will be a net deficiency of £88,875.

FULHAM.—The Highways Committee recommends the provision of vehicle-actuated traffic signals costing £400 at Fulham Road junction.

Newcastle-upon-Tyne.—TRACK NOT TO BE RENEWED.—The Transport and Electricity Committee in its estimates for 1933-34 has decided, instead of allocating £10,980 for the renewal of the Westgate Road tramways, to spend £2,500 on the maintenance of the present track. The City Council has approved the scheme.

Norwich.—NEW TRAM TRACK.—The Highways Committee is, by arrangement with the Tramways Co., to lay a double tram track across the new Fye Bridge at a cost of £400.

Nottingham.—TROLLEY-BUS SCHEME.—The Transport Committee has decided upon a large scheme for the substitution of trolley-buses for trams on a number of routes.

Poland.—RAILWAY ELECTRIFICATION.—The Polish State Railways has recently commenced the construction of a 33-mile line between Lodz and Tomaschov, which is to be electrified on the d.c. system. The new line will connect the two main lines which run south-west out of Warsaw.

Communications

Australia.—RADIO REVENUE.—During the year ended June 30th, 1932 (the latest period available) the amount collected in wireless licence fees, including fines, was £160,575. A payment of £207,694 was made to the Australian Broadcasting Co., and another of £51,455 to Amalgamated Wireless (Australasia), Ltd., for patent rights. Upkeep and operation of broadcasting stations amounted to £63,098 (stations £37,871, and studios £25,226). The surplus is £44,433, or £30,932, with interest charges included.

LOSS ON TELEPHONE SERVICES.—The Australian Postmaster-General, Mr. Parkhill, in a letter to Mr. Jennings, Member of the House of Representatives, states that financial considerations prevent the granting in the near future of any reduction in telephone charges. Mr. Parkhill states that more than £1,500,000 has been lost on the telephone services of the Commonwealth in the last five years. Before the present rates came into force in December, 1929, the trunk line charges had remained unaltered for thirteen years and local charges for nine years, in spite of the heavy increases in the costs of labour and material. The present rental is £5 10s. per year, plus charges for calls, the rental for the first year being paid in advance.

China.—TELEPHONY.—Work is in progress on the erection of two additional lines for the Shanghai-Nanking long-distance telephone service.

Great Britain.—RADIO RELAY EXCHANGES.—The Highways Committee of the Sedgley Urban District Council is considering an offer from Broadcast Listeners' Service, Ltd.

Broadcast Listeners' Service, Ltd., has informed the Brierley Hill Urban Council that it cannot agree to the terms submitted by the Council, and the latter has decided to consider the application of another firm which desires to establish a relay service.

The Halesowen Urban Council has decided to take no further action with regard to a wireless relay service for the town. Application has been received from the Universal Wireless Relay, Ltd., and Broadcast Listeners' Service, Ltd., and the latter had intimated that it could not agree to the Council's terms.

The Highways Committee of the Notts County Council recommends that consent should be given to the erection of overhead wires for radio relay services, subject to compliance with such conditions as the clerk of the Council may consider desirable.

The Seaford Urban Council has adjourned for a month an application from British Concessions, Ltd.

Irish Free State.—RADIO LICENCES.—The number of broadcast radio receiving licences in force on March 31st last was 32,000, an increase of 3,317 in a year. The normal fee is 10s. per annum; schools and institutions pay £1; hotels and restaurants £5; while cinemas and halls to which the public is admitted on payment are charged £1 per week. An "outside" loud-speaker used for advertisement or demonstration is charged £5 per year.

Norway.—BROADCASTING.—Some months ago the Storting adopted the principle that broadcasting in Norway should henceforth be a Government undertaking instead of being carried on by private companies. The Government has now submitted a Bill to the Storting embodying details of the new system, which will come into force as from July 1st. The new broadcasting corporation will have a board of directors, including five members appointed by the Government. There will be a programme committee of fifteen members, four of whom will be appointed by the Storting and the rest by the Government. The Storting will decide all questions regarding licence and stamp fees, the building of new stations, &c. The annual budget of the corporation will be submitted to the Storting for approval. The net profits may only be used for the development of the broadcasting service. While the technical system is placed under the telegraph authorities (the Ministry of Commerce), the Ministry of Ecclesiastical Affairs and Education will exercise a predominant influence on the programmes, as three members of the board of directors will be proposed by the latter Ministry and only two by the Ministry of Commerce.—*Reuter's Trade Service* (Oslo).

Newfoundland.—NEW WIRELESS STATION.—A wireless station is to be established on "Signal Hill," where Marconi received the first transatlantic wireless signal in 1904. It is intended for the use of the Newfoundland Posts and Telegraphs Department, and will be erected by the Canadian Marconi Company.—*Reuter* (St. Johns).

Stockton-on-Tees.—RADIO INTERFERENCE.—The Corporation Baths Committee, referring to alleged interference with broadcast reception by an electric motor, has informed the sectional engineer of the Post Office Engineering Department that experimental devices will be allowed to remain subject to an annual acknowledgment as to removal within six months. The borough engineer stated that the Postmaster-General had no statutory power under which he could provide suppression devices for attachment to private plant or claim rental therefor, but generally owners of offending plant, at their own expense, had done all in their power to eliminate interference. He therefore asked the Committee to reconsider the matter and arrange for the permanent installation of the devices which, if supplied and fitted by the Post Office would cost £3 2s.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Argentina.—Buenos Aires.—June 19th. Ministry of Public Works. Hydro-electric plant, including turbo-generators, Diesel-electric generators, transformers, switchboards, accessories, spares and tools. (A.X. 11767.)*

Australia.—Melbourne.—May 30th. Posts and Telegraphs Department. Rubber-insulated telephone wire (A.X. 11778)* and cordless telephone switchboards (A.X. 11779)*.

Ayr.—May 20th. County Council. Various works, including electrical, in connection with erection of houses at Crosshouse. Mr. W. Reid, county architect, Ayr.

Barking.—May 23rd. Electricity Department. 6,600-V switchgear. (May 12th.)

Bath.—May 31st. Electricity Department. Meters and h.p. and l.p. cables. (May 5th.)

Denbighshire.—May 24th. County Council. Erection of generators and switchboard. (May 12th.)

Dover.—June 2nd. Electricity Department. Transformers. (May 12th.)

Eccles.—May 22nd. Electricity Department. Single-phase a.c. house service meters and two sheet steel transformer kiosks, with e.h.p. and l.p. switchgear equipments and two 150-kVA and one 250-kVA three-phase oil-cooled transformers. Borough electrical engineer, 1, King Street, Eccles.

Egypt.—Cairo.—June 27th. Ministry of the Interior. Electrical distribution network to supply Samallout and Maassaret Samallout. (A.X. 11780.)*

June 15th. Electrically driven pumping set with output of 650 litres per sec. against a total head of 8 metres. (G.X. 12562.)*

June 15th. Ministry of Education. Diesel generating set. (A.X. 11783.)*

June 6th. Ministry of Public Works. Pumping station and plant at Zagazig. (G.X. 12567.)*

Fife.—May 31st. County Couucil. Various works, including electric lighting, at sixteen houses. Mr. G. B. Deas, architect, Central Chambers, Kirkcaldy.

Glasgow.—May 29th. Public Assistance Department. Electrical work and equipment at Lennox Castle Mental Institution. (See this issue.)

Halifax.—May 31st. Health Committee. Boiler-house plant for laundry at Isolation Hospital, Northowram Hall. (May 12th.)

Hastings.—June 3rd. Electricity Department. Boiler fuel. (May 12th.)

Kirkcudbright.—May 31st. County Council. Transformers. (May 12th.)

Liverpool.—May 29th. Electricity Department. H.p. and l.p. switchgear. (See this issue.)

London.—Islington.—May 31st. Electricity Department. Oil purifying equipment. (May 12th.)

Fulham.—June 27th. Electricity Department. Power station extensions, including 12,500-kVA turbo-alternator and 66-kV remote-controlled switchgear. (See this issue.)

Manchester.—June 2nd. Electricity Department. Ash removal plant for Barton power station. (See this issue.)

New Zealand.—Wellington.—July 18th. Posts and Telegraphs Department. Secondary cells. (A.X. 11803.)*

Portugal.—Lisbon.—June 24th. Department of Posts, Telegraphs and Telephones. Supply and installation of a short-wave broadcasting station. Administracao Geral dos Correios, Telegrafos e Telefones, 3a, Divisao da Direccao dos Serviços de Exploraçao Electrica.

South Africa.—Pretoria.—June 2nd. Government Supplies Board. 6,000 sac-type elements for Leclanché cells (A.X. 11786)* and fifteen motor-driven magneto generators (A.X. 11785.)*

West Hartlepool.—May 23rd. Electricity Department. H.p. and l.p. cables. (May 12th.)

Worcester.—May 31st. Electricity Department. Cables, overhead line conductors, transformers and meters. (See this issue.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Acton.—Baths Committee. Accepted. Combined steam engine and dynamo (£439).—Bellis & Morcom (dynamo by Crompton Parkinson, Ltd.).

Birkenhead.—Electricity Committee. Accepted. Switchgear for the Mersey Tunnel (£560).—New Switchgear Construction Co. The lowest tenderers could not deliver the equipment in less than six weeks, whereas the accepted tender is for delivery at the beginning of June. The difference between the tenders was £38.

Birmingham.—Corporation. Accepted. Electrical equipment for fifty double-deck trolley-buses.—General Electric Co., Ltd.

Bridport.—Town Council. Accepted. Kiosk sub-station and 100-kVA transformer (£186).—Hackbridge Electric Construction Co., Ltd.

Dorchester.—Town Council. Accepted. Wiring twenty-four houses at Victoria Park (£115).—A. J. Dalton Electrical Services.

Glasgow.—Lighting Committee. Accepted. Electrical fittings and accessories.—J. Fotheringham; British Electrical and Manufacturing Co.; Ward & Goldstone, Ltd.; Wood & Cairns; Walsall Conduits, Ltd.; Wm. McGeoch & Co.

Health Committee. Accepted. Annual stores for the various hospitals.—Electrical fittings: General Electric Co., Ltd. (for all items except flexible cables). Flexible cables: Simplex Electric Co., Ltd.

Housing Committee. Accepted. Electrical installation extension at Netherton (£126).—F. McCready.

London.—Southwark.—Works Committee. Recommended. Traffic light systems.—Chance Bros. & Co., Ltd.; Automatic Electric Co., Ltd.

Stoke Newington.—Electricity Committee. A.c. meter testing equipment (£401).—Metropolitan-Vickers Electrical Co., Ltd.

L.C.C. Highways Committee. Accepted. Porcelains for track insulator standards.—Bullers, Ltd. Copper bonds.—British Insulated Cables, Ltd. Electrodes.—Quasi-Arc, Ltd.

Housing Committee. Accepted. Wiring and fittings for electric lighting on housing estates.—East Dulwich Estates (£680).—A. Meckhonik. West Ferry road site (£335).—G. E. Thomas & Co. Deptford Park Estate (£947) and Lilestone Estate (£560).—Hall & Stinson, Ltd.

Shoreditch.—Electricity Committee. Recommended. Cable.—Metropolitan Electric Cable & Construction Co., Ltd.

Chelsea.—General Purposes Committee. Accepted. Installation of storage battery, motor-generator and switchboard in connection with alternative lighting at the Town Hall.—Chloride Electrical Storage Co., Ltd. Wiring alterations.—T. Clarke & Co., Ltd.

Manchester.—Education Committee. Accepted. Electrical installation at Green End Junior Boys' School.—C. M. Evans & Sons, Ltd. Electrical installation at Benchill Municipal School.—Seddon & Sons (Manchester), Ltd.

Housing Committee. Accepted. Electrical installations in four shops on the Blackley (Victoria Avenue East) Estate.—C. M. Evans & Sons, Ltd.

Northamptonshire.—County Council Health Committee. Recommended. Electrical engineering work at Berry Wood mental hospital (£1,815).—Barnett & Soans.

Portsmouth.—Corporation Electricity Committee. Accepted. Six 100-kVA transformers (£62 each).—Yorkshire Electric Transformer Co. Four 400-kVA transformers (£146 each) and four 500-kVA (£171 each).—Electric Construction Co., Ltd. Six 50-kVA buried type transformers (£89 each).—Hackbridge Electric Construction Co., Ltd.

St. Mary Cray.—Council. Accepted. Installing electric light at the new baths.—S. Edwards.

Forthcoming Events

Birmingham Electric Club.—Friday, May 19th. Annual outing. Visit to the Hollinwood works of Messrs. Ferranti, Ltd.

Physical Society.—Friday, May 19th. Imperial College of Science and Technology, S. Kensington. 5 p.m. Short papers.

Institution of Electrical Engineers.—(*Irish Centre (Dublin)*).—Friday, May 19th. 1, Foster Place, College Green, Dublin. Annual general meeting. (*North-Western Centre*).—Tuesday, May 23rd. Engineers' Club, Manchester. 7 p.m. General meeting. (*North-Western Students' Section*).—Saturday, May 27th. Joint summer visit with the Liverpool Section to the Percival Lane power station of the Mersey Power Co., Ltd.

Société des Ingénieurs Civils de France.—Monday, May 22nd. Institution of Mechanical Enginers, London. 6 p.m. Joint meeting with the Institute of Fuel. "Pulverised Fuel and its many Industrial Applications." Dr. G. E. K. Blythe.

Tramways, Light Railways & Transport Association.—June 8th and 9th. Leeds. Annual congress.

Incorporated Municipal Electrical Association.—June 12th-17th. Bournemouth. Annual convention.

Overhead Lines Association.—June 16th-18th. Bristol. Summer meeting.

Municipal Tramways & Transport Association.—June 21st. Hull. Annual conference.

Association of Mining Electrical Engineers.—June 26th-30th. Blackpool. Annual convention.

Electrical Contractors' Association.—July 5th-7th. Torquay. Annual convention.

Atmospheric Electricity

Professor J. T. MacGregor-Morris, Professor of Electrical Engineering at East London College, addressing the Scottish Centre of the Institution of Electrical Engineers in Dundee on May 12th, said that there were four ways in which electricity showed itself in our atmosphere. First, glow discharge, the quivering, silent aurora; second, the brush discharge, sometimes called "St. Elmo's fire"; third, the spark, such as forked or sheet lightning; and finally, globular or ball lightning, which, though of very rare occurrence, was thoroughly well authenticated. At any time in the world there were 2,000 thunderstorms going on, and although any single one of them was seldom more than a half to seven miles up, yet their effects could be felt up to three or four thousand miles away.

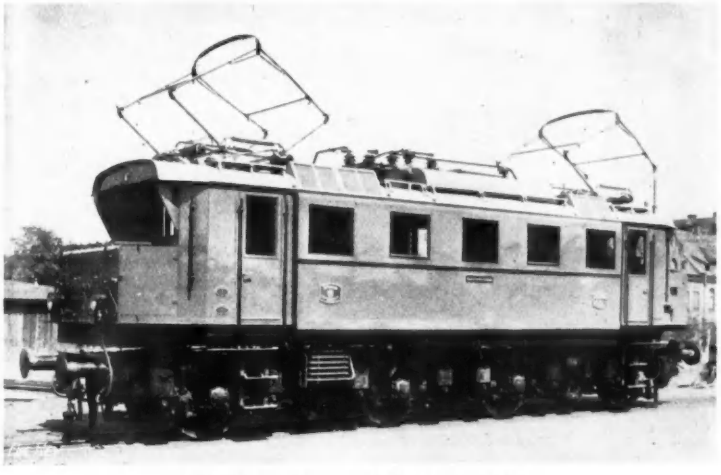
On the following day members of the centre and friends made an excursion from Dundee to Pitlochry by road, *via* Blairgowrie and Kirkmichael. Lunch was served at Fisher's Hotel, Pitlochry, and in the afternoon visits were made to places of interest in the neighbourhood, including the new hydro-electric station at Tummel Bridge.

Notes

Thornhill Power Station Modernised

Thornhill is the Yorkshire Electric Power Company's original generating station from which supply was first given in January, 1905. The initial plant consisted of three 1,500-kW vertical Curtis steam turbo-alternators and four 20,000-lb. B. & W. boilers with steam conditions of 150 lb. per sq. in. and 450 deg. F. The three-phase 50-cycle alternators generated at 11 kV, a high pressure for those days. Additional plant brought the total capacity to 44,500 kW, but further extensions were stayed when the company established the Ferrybridge station in 1925.

In 1931 it was decided to remodel the Thornhill station by replacing some 7,500 kW of inefficient plant by a 30,000-kW, 3,000-r.p.m. turbo-alternator designed for a steam pressure of 415 lb. per sq. in. at a total temperature of 750 deg. F. The original foundation raft and turbine house structure was utilised and only minor modifications were necessary in order to carry the greater weights; the new machine fits into the space occupied by the original machines and provides four times the generating capacity. The original boiler house was demolished and rebuilt to contain four 100,000-lb. Stirling boilers equipped with travelling-grate stokers for balanced draught, economisers and air heaters; steam conditions are 450 lb. per sq. in. and 780 deg. F. Further particulars of the new plant were given in our issue of June 17th, 1932, on the occasion of the I.E.E. visit.



A 3,000-h.p. German electric locomotive

This new station has been in continuous operation from the beginning of the year under the control of the Central Electricity Board as one of the base load stations for the Mid-East England Area, and a summary of four months' operating results is given below :—

kWh generated		59,002,000
kWh sent out		55,925,000
Maximum load	kW	31,000
Load factor (generated)	%	66
Coal burnt	tons	30,300
Average gross calorific value	B.th.u. per lb.	11,570
Coal per kWh generated	lb.	1.15
Coal per kWh sent out	lb.	1.21
Thermal efficiency, energy generated		25.64%
Thermal efficiency, energy sent out		24.30%

Directive Street Lighting

The principles of directive road illumination are dealt with in the paper by Lieut-Com. Haydn T. Harrison (president) which was read before the Illuminating Engineering Society in London on May 9th. Members of the Association of Public Lighting Engineers attended the meeting. Special apparatus and means of directing light along streets are not discussed. Illumination by motor car head lamps is compared with unidirectional lighting, in which no glare should exist in correctly designed systems.

In 1927 the author calculated that even at that time over 90,000 kW of electrical plant, valued about £18,000,000, was installed in motor vehicles for lighting purposes only. Such generating plant is inefficient (inasmuch as it is operated in unfavourable conditions and includes storage) and consumes petrol, which is largely an imported product. Mr. Harrison submits that if more of our roads were lighted by public authorities using coal for the generation of gas or electricity this wastage would be saved, and our national industry of coal production would be benefited to an extent much in excess of the above figures.

The paper emphasises the fact that illuminating engineers are now in a position to control the distribution of luminous energy to such a degree of accuracy that the low efficiency of many of the street- and road-lighting installations which now exist can only be looked upon as a disgrace to this country, but it is gratifying to note that this is now more generally realised, as scientifically designed directive devices have been and are now being widely adopted both for gas and electric public lighting, and they are certainly becoming more common than the old symmetrical distribution, which, it is hoped, will shortly become obsolete, except for conditions where it is suitable.

Appointments Vacant

Lecturer in electrical engineering for Hull Municipal Technical College.

Switchboard attendant for Grimsby Electricity Department.

(See our classified advertisements.)

New German Electric Locomotives

The German State Railways have recently put into service a number of new electric locomotives, which, for passenger and fast goods traffic, are unusual in being of the double-bogie type, this arrangement also being a rarity with the single-phase system. Designed to operate from a line voltage of 15,000 V at 16⅔ cycles, each locomotive incorporates a 2,000-kVA transformer, which reduces the pressure to 418 V before passing it to the four nose-suspended traction motors, each of which has an hourly capacity of 740 h.p. at a road speed of 30 m.p.h. The motors are forced-ventilated by two blower sets, and the transformer is air-cooled by a similar set. The 50-in. locomotive wheels are driven through double gears having a ratio of 1 : 3.25, and the axle boxes are all of the roller-bearing type. These locomotives were designed to give maximum power for minimum weight, and, compared with the previous rigid-frame locomotives of the same capacity, their weight of 79 tons is a reduction of not less than 25 per cent., and brings down the weight per horse-power to 59 lb. The electrical portion accounts for 39½ tons, against 55 tons in the previous machines, while the length over buffers is 44 ft. 4 in., a saving of 12 per cent. Other main particulars are: bogie wheelbase 10 ft. 10 in.; total wheelbase 30 ft. 2 in.; maximum speed 50 m.p.h.; the locomotive underframe is in the form of a single casting 40 ft. long by 6 ft. wide, the outriggers being electrically welded on; a Kunze-Knorr airbrake and air- and hand-operated pantographs are incorporated.

I.E.E. Scholarships

Applications are invited for scholarships administered by the Institution of Electrical Engineers. The Duddell Scholarship, £150 per annum for three years, is for a whole-time day course. The Ferranti Scholarship, £250 per annum for two years, and the Swan Memorial Scholarship, £120 for one year, are both for whole-time research or post-graduate work and may be made travelling scholarships. The Silvanus Thompson Scholarship, £100 per annum and tuition fees for two years, is for a whole-time course for works employés whose parents possess limited means. Nomination forms and details are obtainable from the Institution.

A Queer Home for Mice

The photograph reproduced on page 706 was received from Scarborough Electricity Department showing eight mice laid in the end shield of a "Brook" motor. The electrical engineer says that on many occasions he has found one or two mice inside a motor, but never as many as on this occasion. The motor was being overhauled and cleaned and had not broken down. The mice were found as illustrated, and all were dead. None of them seemed to have suffered any injury, nor had the motor been prevented from working. The photograph was supplied by Mr. Edwin F. Fox, 51, Aberdeen Walk, Scarborough.

I.E.E. (North-Western Centre)

A general meeting of members and students of the North-Western Centre of the Institution of Electrical Engineers will be held on Tuesday next at the Engineers' Club, Manchester, to consider a proposal that a group or sub-section of the Centre should be formed for the purpose of studying economic and financial questions affecting industry and employment.

B.E.A. Luncheon

The next luncheon meeting of the British Engineers' Association will take place at the Hotel Victoria, W.C.2, on Tuesday, June 13th. Mr. C. Mitchell, chairman of Dorman Long & Co., Ltd., will speak on the reorganisation of the iron and steel industry.

A College Laboratory

A temporary high-frequency laboratory is to be erected at an estimated cost of £250 for Loughborough College in the old fire engine house at Loughborough. The estimate covers the expenditure of £135 on additional apparatus and the laying of wooden flooring and is to be met by the Leicestershire County Educational Committee out of the estimate for equipment reserve and apparatus.

Makers' Names Wanted

LITTALITE strip lighting.

SCIMITAR wash boiler.

Bakelite switches, q.m.b. action. No. 30001/1.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. A. Nichols Moore, borough electrical and tramways engineer, Newport, Mon, has been nominated chairman of the Western Centre of the Institution of Electrical Engineers for the 1933-34 session.

[*Elliott & Fry*

Mr. P. N. Rand

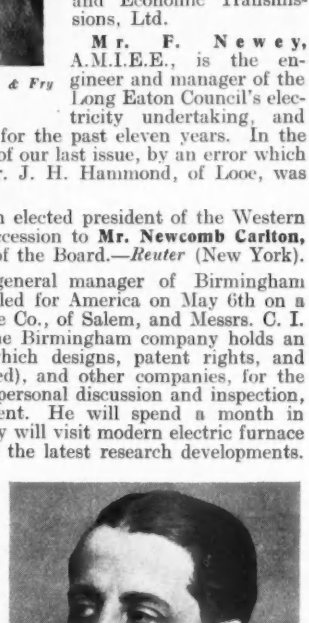
Mr. P. N. Rand, M.I.E.E., has joined the board of Electrical & Engineering Products, Ltd., and has been appointed joint managing director. Mr. Rand was for over five years general sales manager of the English Electric Co., Ltd., which position he resigned in November last, and prior to that he held a similar position for about eight years with the Metropolitan-Vickers Electrical Co., Ltd. Mr. Rand is also a director of the Kromard Paint Co., Ltd., and Economic Transmissions, Ltd.

Mr. F. Newey, A.M.I.E.E., is the engineer and manager of the Long Eaton Council's electricity undertaking, and has been responsible for it for the past eleven years. In the table of results on page 681 of our last issue, by an error which we regret, the name of Mr. J. H. Hammond, of Looe, was inserted.

Mr. R. B. White has been elected president of the Western Union Telegraph Co. in succession to **Mr. Newcomb Carlton,** who has become chairman of the Board.—*Reuter* (New York).

Mr. A. Glynne Lobley, general manager of Birmingham Electric Furnaces, Ltd., sailed for America on May 6th on a visit to the Electric Furnace Co., of Salem, and Messrs. C. I. Hayes, Inc. (with whom the Birmingham company holds an agreement by means of which designs, patent rights, and technical data are exchanged), and other companies, for the purpose of augmenting, by personal discussion and inspection, the results of this agreement. He will spend a month in America, and during his stay will visit modern electric furnace installations and investigate the latest research developments.

Mr. A. M. Manighetti, who, as already stated, has been appointed resident representative in Birmingham for Switchgear & Cowans, Ltd., for the Midlands and South West England, has been acting in a consulting capacity in Europe for the past three years, involving travel in all Continental countries west of Russia. He has now given up his residence abroad. Mr. Manighetti, who was trained at the Northampton Polytechnic Institute, after which he was in the service of the North Metropolitan Electric Power Supply Co., later joined the Hewittic Co., of London and Paris. He was engaged in rectifier development as early as 1913, and in 1919 went to Paris as chief of the Hewittic Research Department. Here he worked with the late M. Maurice Leblanc and later with the latter's son. In 1926 Mr. Manighetti was chief engineer of the Hewittic Co., London, and was responsible for the design of bulb-type rectifiers for sub-station duty.



[*Elliott & Fry*

Mr. A. M. Manighetti

Mr. H. C. Siddeley, M.I.E.E., who went out to Argentina last year as representative of the British Electrical and Allied Manufacturers' Association, has been elected chairman for the ensuing year of the Buenos Aires centre of the Institution of Electrical Engineers. Mr. Wright, of the Western Railway, the previous chairman, is the vice-chairman, and Mr. Parrott remains secretary and treasurer.

Mr. A. L. Barclay, district manager at Chester of the Post Office Telephones, who has been appointed district manager at Liverpool, has been presented by the postmaster, superintendent, and switch-room staff with a silver cigar case.

Mr. J. Mortimer Hawkins, managing director of Mortimer, Gall & Co., Ltd., electrical engineers, is to be married on Saturday, June 3rd, at Great Barr, Birmingham, to Constance Edna, daughter of Mr. and Mrs. W. E. Meachem.

Conference on Communications.—Great Britain is represented at the European Conference on Communications, which opened at Lucerne on May 15th, by Mr. F. W. Phillips and Col. A. F. Angwyn, of the General Post Office; Mr. C. H. Boyd, of the Board of Trade; and by Admiral Sir Charles Carpendale, Mr. Noel Ashbridge, and Mr. C. F. Atkinson, representing the B.B.C. The Conference has as its principal aim the redistribution of wavelengths.—*Reuter* (Berne).

[*Wykeham Studios*

Capt. H. V. Schofield

Capt. H. V. Schofield, M.C., who for many years has held the position of export manager to the Chloride Electrical Storage Co., Ltd., has recently been appointed sales manager in succession to Mr. D. P. Dunne, who, although the managing director of the company, has also acted as sales manager for a considerable number of years. Capt. Schofield, who is a native of Richmond, Yorks, commenced his career at the electricity works of the Whitby Urban District Council, where he was a pupil for three years and a shift engineer for two years. He was then with the Newcastle & District Lighting Co. until 1914, when he joined the staff of the Chloride Co., with whom he has remained, except for his war service.

Major W. T. Conder has been appointed general manager of the Australian Broadcasting Commission, in succession to the late Mr. H. P. Williams. Major Conder was formerly managing director of the Broadcasting Company of Australia, Ltd., and subsequently of the Dominion Broadcasting Co., Ltd. His salary will be £2,000 a year.

Mr. A. D. Bickmore and **Miss D. A. Miller,** of the staff of Crompton Parkinson, Ltd., who were married on May 6th, were presented with an oak table and pedestal and an eiderdown by their colleagues, and Mr. Bickmore also received an oak striking clock from the company's athletic club.

Mr. N. Applebee, borough electrical engineer, Ashton-under-Lyne, has asked to be relieved of part of his duties owing to the state of his health. The Electricity Committee has resolved that he shall be retired to the position of consulting engineer, as from July 31st, for a period of three years, at a salary of £250 per annum, the position then to be reviewed.

Mr. J. A. Crabtree, head of the well-known business of J. A. Crabtree & Co., Ltd., of Walsall, is president for 1933-1934 of the Rotary International Association for Great Britain and Ireland. In his inaugural address, delivered at Scarborough last week, he struck an optimistic note regarding the economic situation. He said that up to the present it had been difficult to say truthfully that things were improving, but he found himself coming to the feeling that the world as a whole had seen the worst. Mr. Crabtree contributed to the ELECTRICAL REVIEW of March 14th, 1930, a striking article on "The British Electrical Industry during the Next Decade," indicating changes that were in progress, emphasising the importance of salesmanship in electricity supply, and discussing the effects of the infiltration of American capital and control into the world's industries. In the three years and more that have elapsed since then, momentous events both international and economic, then unforeseeable, have taken place. We have found it quite interesting to re-read his article, and we welcome his Scarborough utterance.

Mr. J. A. Crabtree

With reference to the appointment, already mentioned, of **Mr. W. H. Duffett,** the acting manager, to be engineer and manager of the Rotherham Corporation Electricity Depart-

ment, we are informed that the post vacated by Mr. Duffett is to be filled from the existing staff.

I.E.E. Awards.—The Council of the Institution of Electrical Engineers has made the following awards of premiums for papers read during the session 1932-33, or accepted for publication:—Institution Premium: Mr. J. M. Kennedy and Miss D. M. Noakes, B.Sc. Ayrton Premium: Messrs. A. B. Read and J. W. T. Walsh, M.A., D.Sc. Fahie Premium: Messrs. J. H. E. Baker, B.Sc. (Eng.), and E. P. G. Wright. Kelvin Premium: Mr. P. Dunsheath, O.B.E. Paris Premium: Mr. W. S. Burge. Webber Premium: Messrs. C. E. Horton, M.A., and C. Crampton, B.Sc. Overseas Premium: Mr. G. Yoganandam, B.E. (India). Extra Premiums: Messrs. J. C. Besly and H. V. Higgitt, Mr. Andrew R. Cooper, Mr. E. A. Hanney, M.Eng., Messrs. P. Hunter-Brown and C. J. Hews, Lt.-Col. A. G. Lee, O.B.E., Lt.-Col. F. A. Cortez Leigh, T.D., and Mr. R. P. Smith. In the Wireless Section the Duddell Premium has been awarded to Mr. E. C. S. Megaw, B.Sc., and extra premiums have been awarded to Mr. L. B. Turner, M.A., and Messrs. W. Ure, B.Sc., E. J. Grainger, M.Sc., and H. R. Cantelo, M.Sc.; while in the Meter and Instrument Section the Silvanus Thompson Premium has been awarded to Mr. J. McG. Bruckshaw, M.Sc., and extra premiums to Messrs. F. P. Burch, B.A., and R. V. Whelpton, M.Sc., and Messrs. C. Midworth and G. F. Tagg, B.Sc. (Eng.).

Mr. J. T. Graham

Mr. J. T. Graham, A.R.T.C., M.I.M.E., general works manager of Messrs. Worthington-Simpson, Ltd., was elected a director, in place of the late Mr. T. C. Pulman, at a meeting of the board held on April 28th. Mr. Graham has been associated with Messrs. Worthington-Simpson, Ltd., for the past fifteen years, and was previously connected with Messrs. William Beardmore & Co., Ltd., the Wallsend Slipway & Engineering Co., Ltd., and the Cunard Steamship Co., Ltd.

Mr. W. Lawson, of the Birmingham Corporation Electricity Department, has been nominated as chairman of the Meter and Instrument Section of the Institution of Electrical Engineers for the session 1933-34.

Mr. Howard Foulds, secretary of Callender's Cable & Construction Co., Ltd., has been elected vice-chairman of the Council of the recently enlarged district of Caterham and Warlingham.

Mr. L. G. Sloan, J.P., is seen with Mrs. Sloan in the accompanying picture at the opening of the new showrooms of the Sloan Electrical Co., mentioned in our "Business Notes." At the ceremony Mr. Sloan was presented by his staff with a

Mr. and Mrs. L. G. Sloan

Smith's electric clock, and Mrs. Sloan received the bouquet which appears in the picture.

Obituary

Mr. R. Eyre.—Mr. Robert Eyre, J.P., who died on May 9th at the age of seventy-eight, had for thirty years been chairman of Eyre & Sons, Ltd., of Chesterfield, and also chairman of Watertight Fittings, Ltd., a development of the electrical department of Eyre & Sons, Ltd. He was a borough magistrate, and had served on the Town Council.

Mr. S. Such.—The death occurred on May 3rd, at the age of sixty-four years, of Mr. Sam Such, founder of the business of John Such & Sons, Ltd., electrical engineers, Cheltenham. He is succeeded in the business by his son, Mr. Samuel A. Such.

Mr. J. D. R. Hammett.—The death has occurred, from injuries received six months ago in a motor cycle accident, of Mr. John D. R. Hammett, an electrical engineer on the staff of the Herne Bay Urban District Council. He was thirty years of age.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

George Cowan, Ltd.—Private company. Registered May 15th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of and dealers in wireless telegraph, television and telephone apparatus, &c. The permanent directors are: G. Cowan, 47, Farndale Road, Newcastle-on-Tyne; and T. Rodger, 29, Grainger Street West, Newcastle-on-Tyne.

Charles H. Ward (Electrical), Ltd.—Private company. Registered May 15th. Capital, £100 in £1 shares. Objects: To carry on the business of electrical engineers, electricians, mechanical engineers and manufacturers, &c. The first director is C. H. Ward, 9, Bournville Avenue, Heaton Chapel, Stockport. Solicitors: F. Edwin Monks, 2, Cooper Street, Manchester.

H. & C. Wireless, Ltd.—Private company. Registered May 15th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of, agents for and dealers in radio and electrical goods or appliances, and gramophone sets and accessories, electricians, mechanical engineers, &c. The subscribers are: H. Hardy, 199, Argyle Road, Ealing, W.13; and T. Clark, 35, Drury Road, Colchester. Solicitors: Wainwright, Pollock & Co., 9, Bush Lane, E.C.4.

A. T. Cooper, Ltd.—Private company. Registered April 28th. Capital, £500 in 10s. shares. Objects: To carry on the business of manufacturers of and dealers in radio, sound production, and television sets, &c. The directors are: A. T. Cooper and Mrs. Edith C. Cooper, both of Shendish Cottages, Shendish, King's Langley. Registered office: 101, Marlowes, Hemel Hempstead, Herts.

M. C. Dizer, Ltd.—Private company. Registered May 10th. Capital, £3,000 in £1 shares. Objects: To carry on the business of electrical, wireless, mechanical and general engineers, &c. The subscribers are: J. E. Lawler, 1, Broad Street Place, E.C.2, and R. H. Walling, 66, Lewisham Park, Lewisham, S.E.13. Registered office: 1, Broad Street Place, E.C.

Lite Distributors, Ltd.—Private company. Registered May 3rd. Capital, £500 in 400 10 per cent. cumulative preference shares of £1 and 2,000 ordinary shares of 1s. each. Objects: To carry on the business of manufacturers, exporters and importers of, agents for and dealers in all articles connected with signs for advertising or otherwise; radio, telephone, electrical apparatus, &c. The permanent directors are: P. F. W. Pictor-Wayne (chairman), Netherly, Box, Wilts; and E. R. Wiltshier, "Aultone," King's Avenue, Carshalton Beeches, Surrey. Registered office: 20, Essex Street, Strand, W.C.2.

Devonia Finance Corporation, Ltd.—Private company. Registered May 4th. Capital, £3,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in radio, electrical and hardware goods; to finance dealers in radio or electrical and hardware goods under hire-purchase agreements; to lend money and negotiate loans, &c. The first directors are: F. D. Newcombe, 19, Waverley Avenue, Exeter, and two others. Registered office: 5, Bampfylde Street, Exeter.

Edward Smith (Electrical Accessories), Ltd.—Private company. Registered May 2nd. Capital, £100 in £1 shares. Objects: To carry on the business of electricians, electrical, mechanical, civil and constructional engineers, manufacturers of and dealers in electrical and other apparatus, &c. The first directors are: E. C. S. Butler, "Winton," 67, Marlpit Lane, Coulsdon; and E. Smith, 12, Aden Grove, Stoke Newington, N.16. Registered office: 12, Aden Grove, Stoke Newington, N.16.

Returns of Electrical Companies

Lancashire Telephone Systems, Ltd.—Capital, £10,000 in 5,000 8 per cent. participating preference and 5,000 ordinary shares of £1 each. Return dated January 14th, 1933. 700 preference and 5,000 ordinary shares taken up. £5,080 paid on 700 preference and 4,380 ordinary shares, £620 considered as paid on 620 ordinary shares. Mortgages and charges: £2,300.

Thomas Wilkinson (Arnside), Ltd.—Satisfaction (1) in full on April 6th, 1933, of equitable charge dated December 9th,

1929, and registered December 17th, 1929, (2) on same date of debenture dated September 13th, 1932, and registered September 17th, 1932, and (3) on April 4th, 1933, of debenture dated September 15th, 1932, and registered September 17th, 1932.

Brookhirst Switchgear, Ltd.—Particulars filed of £10,000 debentures authorised April 28th charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Zetavox Radio & Television, Ltd.—Debenture dated April 21st to secure £10,000 charged on the company's undertaking and property, present and future, including uncalled capital. Holders: S. Kalisky (Aldgate), Ltd., 146, Theobalds Road, W.C.1.

Salaman Handoll, Ltd.—Issue on April 21st of £200 debentures, part of a series already registered.

Werneth Electrical Engineering Co., Ltd.—L. Slater, 4, Clegg Street, Oldham, was appointed receiver on May 9th, 1933, under powers contained in debentures dated November 22nd, 1922.

Cam Electrical, Ltd.—C. Latham, 78, New Oxford Street, W.C.1, was appointed receiver and manager on May 4th, under powers contained in first mortgage debenture dated October 5th, 1932.

A. W. H. Sound Reproducing Co., Ltd.—Debenture dated May 5th, 1933, to secure £2,000, and premium of £200, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: Karflex, Ltd., 108a, Cannon Street, E.C.

Battery Components, Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1932. 40 shares taken up. £40 paid. Mortgages and charges, nil.

Jesmond Electrical & General Engineering Co., Ltd.—E. Macartney, 2, Eldon Square, Newcastle-on-Tyne, ceased to act as receiver or manager on March 11th.

Detex (1931), Ltd.—E. P. R. d'Heguenet-Llewellyn, 5, Featherstone Buildings, W.C., was appointed receiver and manager on March 14th, under powers contained in debentures dated June 9th, 1932, and June 17th, 1932.

Stelmar Projection Lighting Co., Ltd.—Capital, £15,000 in £1 shares. Return dated January 11th, 1933. 13,500 shares taken up. £7,600 paid. £5,900 considered as paid. Mortgages and charges, nil.

Woodstock Power Syndicate, Ltd.—Capital, £10,000 in £1 shares. Return dated December 27th, 1932. 3,510 shares taken up. £3,510 paid. Mortgages and charges, £2,300.

Goldvick Electrical & Radio Co., Ltd.—P. J. Goodchild, 19, London Wall, E.C., was appointed receiver and manager on April 10th, 1933, under powers contained in debenture dated June 16th, 1932.

Eastern Counties Relay Services, Ltd.—The nominal capital has been increased by the addition of £1,500 beyond the registered capital of £500. The additional capital is divided into 1,300 ordinary shares of £1 and 4,000 ordinary shares of 1s. each.

Tyne Illuminations, Ltd.—The nominal capital has been increased by the addition of £2.000 in £1 ordinary shares beyond the registered capital of £1,000.

Walter Denis Manufacturing Co., Ltd.—W. D. Meagher, 2, Longford Street, N.W.1, ceased to act as receiver and manager on April 29th.

Wand & Mitchell, Ltd.—Capital, £500 in £1 shares. Return dated December 14th, 1932 (filed April 7th, 1933). 302 shares taken up. £302 paid. Mortgages and charges, nil.

Wilkins Electrical Works, Ltd.—Capital, £1,000 in £1 shares. Return dated January 14th, 1933. 865 shares taken up. £240 paid, £625 considered as paid. Mortgages and charges, nil.

Electro-Mechanical Supplies, Ltd.—Capital, £3,000 in £1 shares. Return dated August 4th, 1932 (filed January 6th, 1933). 999 shares taken up. £999 paid. Mortgages and charges, nil.

Fred Dawson & Co., Ltd.—J. P. Wardale, Hepper House, East Parade, Leeds, was appointed receiver and manager on April 28th, under powers contained in debentures dated October 12th, 1932.

A. E. Morrison & Sons, Ltd.—Two equitable mortgages (1) on land in Grace Road, Leicester, and (2) on land, workshops, &c., in Aylestone, Leicester, both dated April 13th, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Steatite & Porcelain Products, Ltd.—Particulars filed of £30.000 debentures authorised May 1st, charged on the company's undertaking and property, including uncalled capital, the whole amount being now issued.

Pix Valves, Ltd.—The nominal capital has been increased by the addition of £2.000 beyond the registered capital of £100. The additional capital is divided into 2,000 "A" ordinary shares of £1 each.

British Pix Co., Ltd.—Satisfaction to the extent of £1.000 on April 1st, of debenture dated July 5th, 1932, and registered July 7th, 1932.

Hamer & Co., Ltd.—Satisfaction in full on April 7th, 1933, of mortgage dated October 9th, 1919, and registered October 28th, 1919, securing £1,512.

Sloan Electrical Co., Ltd.—Issue on May 5th of £3,000 debentures, part of a series already registered.

City Notes

Babcock & Wilcox, Ltd., held their annual meeting recently, when Sir John Dewrance (chairman), in the course of his speech, said that despite the abnormal times the proportions of the deficits incurred by those of their subsidiaries which had made losses were relatively small, and the majority had made reasonable profits. There was a lengthy period between the receipt of an order and its completion, due to the nature of their work, so that the fall in input was not reflected immediately in the trading results, and the results of 1930 and 1931 did not truly reflect the falling-off in the volume of new business. The larger volume of previous years had now been practically worked out, and the amount of their invoices for 1932, as compared with 1931, fell by approximately 25 per cent. The reduced output was not due to failure to secure their proper share of the business that was offering; they had actually secured a larger proportion than usual. For the current year to date the input of new business was considerably in excess of that received during the corresponding period of last year. During the year under review the transfer of the work carried on at Lincoln was completed and further economies had been carried through in the early part of the current year. The grid system was practically complete, and until the growth of the use of electricity had reached a point where the existing plant was more nearly loaded there might be a slowing-down in the rate at which new boiler plant, and other products of the company, would be required in the Home market for electrical purposes. With regard to overseas trade, South Africa and India were showing signs of revival, but the markets in South America, Australia, New Zealand, the Far East and Europe generally, were all affected adversely by present world conditions. These difficulties would pass, but until improvement in this direction definitely took place, they could not be expected to secure the same profits as they earned in more normal or boom periods. They were studying the possibilities of new lines of manufacture. The position of the company was an exceptionally strong one.

The London Electric Wire Co. & Smiths, Ltd., held their annual meeting on May 5th, Mr. W. J. Terry (chairman) presiding. In presenting the report and accounts (ELEC. REV., May 12th, page 689) the chairman said during last year the prices of commodities continued to fall. The price of electrolytic copper, in which they were primarily interested, stood at about £50 per ton at December 31st, 1931, as against the market price of £34 10s. a year later. Since the beginning of 1933 there had been a rise in the price of copper, and this market was showing signs of improvement. There was now a better understanding existing between copper producers and manufacturers, as instanced by the formation of the Copper Development Association. Trading conditions throughout the year under review had been increasingly difficult, but they were fortunate enough to maintain a turnover which was proportionately the same as in the previous year, although it was far below their manufacturing facilities. They had given considerable thought to the development of new interests and the widening of the scope of the company's activities. The development of their enamelled wire had proceeded satisfactorily, and they were now in an excellent manufacturing position. The extension of the radio side of their business had been retarded, however, by the severe slump which had affected the whole of this new industry. It was impossible, under present conditions, to forecast the future, but they were in a strong position with respect to liquid resources to meet existing competition, and to take full advantage of the trade revival to which they hopefully looked forward.

The Cawnpore Electric Supply Corporation, Ltd.—Presiding at the annual meeting on May 16th, Mr. J. G. B. Stone (chairman), said that during the year under review Cawnpore had been quiet and orderly. The industrial demand for their supply had been increased but the economic situation had tended to decrease the use of electricity by the private householder. A new contract had just been arranged for the public lighting. This would extend the lighting, they believed, and would result in a reduction in their charges to the municipality. The sales by special contract would show still further increase, resulting from the supply to a large block of mills. The possibility of the introduction of fresh legislation controlling factory hours might, however, cut down their output for such purposes. The two-part tariff was introduced in April, 1932, but they had been disappointed in the response of the public. Application had been made to the Government for permission to abandon the tramway system, and the Government's decision was expected within the next few days. Progress during the current year was normal and satisfactory.

The Craigpark Electric Cable Co., Ltd.—Presiding at the annual meeting in Glasgow on May 12th, Dr. Magnus MacLean, in moving the adoption of the report and accounts, stated that the profits for the year had been seriously affected by the continuous fall in selling prices, particularly during the last six months of the financial year. Manufacturing costs and other expenses could not be reduced in relation to the lower selling prices. The bulk output of the works had been quite satisfactory, but the causes mentioned had reduced the sterling value obtainable for the output compared with last year. The holding up of electrification schemes and the adverse conditions prevailing were further factors affecting the earnings of the company. At the moment they had good orders in hand. The number of customers continued to grow and the selling organisation at home had been increased, which should bring results as trade improved. Export business had been difficult, but new agents had been appointed and there were indications that this section would gradually expand.

The Calcutta Tramways Co., Ltd., held its annual meeting on May 16th, when Mr. J. G. B. Stone (chairman), who presided, said that towards the end of 1931 nine new cars of modern design were put into service. These were obtained with a view to ascertaining which type would best meet their requirements and they had now set out on a programme involving the replacement on renewals account of the older half of their rolling stock in the next few years. The better results which they had recently obtained began soon after January, 1931, by about which time they had carried through a very considerable revision of fares. During 1924 they were carrying approximately 170,000 passengers a day, and the figure was now about 250,000. During the first quarter of the current year earnings showed an increase of between 4 and 5 per cent.

The Delhi Electric Supply & Traction Co., Ltd., held its annual meeting on May 16th. Mr. K. A. Scott-Moncrieff (chairman), who presided, said in the course of his speech that the progress of the company in 1932 was affected by bad trade in India and by competition by motor buses and hackney car-

riages. With a view to securing better co-ordination of passenger transport at Delhi, they had agreed with the authorities to provide a motor omnibus service on certain outlying routes. They were protected from competition on these routes and also on their tramway routes. These services would be put into operation at the end of the hot weather. Turning to the electricity supply side of the business, he said that the revenue showed a slight increase in spite of the concessions made in their charges. A reduction in rates to power users had just been made; this should lead to a further use of electricity for that purpose. New consumers connected during the year totalled 1,216, and a new street lighting contract had been secured. Further extensions were contemplated which would, they anticipated, add 1,500 new street lamps during the current year.

N.V. Hollandsche Draad en Kabelfabriek.—The report for 1932 states that as a result of the further fall in the prices of raw materials a loss was experienced on the stocks, and the stocks of finished manufactures had consequently to be valued on a lower level, the losses from these causes amounting to 250,000 fl. Moreover, sale prices declined at a quicker rate than it was possible to reduce the costs of production. The value of the turnover fell to 44 per cent. of that in 1929, although from a quantity point of view the volume was maintained at 76 per cent. of that in 1929. In the circumstances the profit and loss account has closed with a deficiency (643,000 fl.) that is larger than the reserve funds (375,000 fl.), so that after absorbing the latter there remains a deficit of 268,000 fl. to be carried forward. The directors complain of foreign dumping in Holland and express doubts as to whether it is in the interest of the country to maintain a condition of unhampered imports while at the same time the greatest difficulties are placed in the way of Dutch exports.

Cables & Wireless, Ltd., reports a gross revenue for 1932 of £705,474, as compared with £726,059 in 1931, and a profit of £649,220 (against £636,168), to which is added £64,688 brought in, making £713,908. The preference dividend (2¾ per cent., less tax) absorbs £638,458, and a balance of £75,450 is carried forward. The consolidated balance sheet shows that the Government and other securities held within the group amounted to £15,105,900, representing a depreciation of £805,749, which, however, is more than offset by the profit of £1,164,513 on the sale of securities. Meeting: May 24th.

Imperial & International Communications, Ltd., reports a gross revenue for 1932 of £4,946,804, as compared with £4,979,023 in the preceding year. In addition to the ordinary expenses there has been provided £137,490 for cable renewals and the sum of £100,000 has been written off in respect of losses of subsidiary companies and the cost of terminating a joint purse agreement and other expenditures. The profit for the year is £80,359, which with £20,665 brought in, makes £101,024. It is proposed to pay a dividend of 5s. per cent., leaving £26,024 to be carried forward. Meeting: May 22nd.

Edmundson's Electricity Corporation, Ltd., reports a net profit for 1932 of £342,795, as compared with £213,138 a year ago. The ordinary dividend is maintained at 7 per cent. on a larger capital, and £24,996 is carried forward. After writing off £80,907, being stamp duty, discount, and issue expenses, the general reserve at £456,524 is practically unchanged. It is proposed to increase the capital to £7,000,000 by the creation of 1,000,000 new ordinary £1 shares. The acquisitions during the year are reflected in the balance sheet total, which is £9,578,000, an increase of £4,588,000.

The Bagdad Light & Power Co., Ltd., is issuing privately 150,000 seven per cent. preference shares of £1 each. This issue is being made to meet the cost of the installation of a modern generating plant having a capacity of 5,000 kW, which the company has now completed for the supply of electricity in Bagdad over a radius of eight miles. The issued capital of the company will then be £450,000, consisting of £250,000 in seven per cent. preference shares and £200,000 in ordinary shares. Its authorised capital is £800,000.

The Urban Electric Supply Co., Ltd., reports a profit for 1932 of £106,006, as compared with £105,694 in the preceding year. To this is added £18,253 brought in, making £124,259. Depreciation reserve receives £30,000, general reserve £5,000, and the staff benevolent fund £2,000. It is proposed to pay a final ordinary dividend of 4 per cent., making 7 per cent. for the year, and to carry forward £17,259. Brig.-Gen. Wade H. Hayes has been appointed to the board to fill the vacancy caused by the death of Mr. F. Massingberd Rogers, and the directors recommend that Sir Holberry Mensforth be appointed an additional director.

Marconi's Wireless Telegraph Co., Ltd., reports a credit balance on profit and loss account for 1932 of £74,735, as compared with £60,007 for 1931. To this is added a balance brought forward, making £96,256, and, after paying the preference dividend, it is proposed to maintain the ordinary dividend at 2 per cent. for the year, to set aside £15,000 for doubtful debts, and to carry forward £23,354. The report states that of the amount of £738,781 shown in the balance sheet as sundry debtors, some £200,000 has since been collected, but that £324,832 represents debts owing by foreign Governments, the greater part of which is still outstanding. A considerable proportion of these debts is not yet due for payment. Meeting: May 23rd.

The British Oxygen Co., Ltd., reports a net profit for 1932 of £100,242, as against £70,160 for 1931. The final ordinary dividend is 3 per cent., making 5 per cent. for the year (against 3 per cent.), and a bonus of 1½ per cent. is also paid, the balance carried forward being £54,491. The report states that the amalgamation of the business of Allen-Liversidge and the company, which took place on January 1st, 1931, is effecting considerable economies, which are reflected in the results obtained for 1932.

Richardsons, Westgarth & Co., Ltd., report a trading loss of £29,621 for 1932, as against £5,418 in 1931. A sum of £22,000 has been transferred from the preference dividend reserve, and with a profit of £15,892 on the sale of conversion loan and war loan it is proposed to write off £3,000 under the agreement with Brown, Boveri & Co., and £1,000 off heavy stampings investment. After paying debenture interest and reduced directors' fees, there is a credit balance of £185.

Philips' Incandescent Lamp Works.—It is announced by Higginson & Co., British fiscal agents for the Holding Company, that the directors of the operating company have decided to recommend a dividend of 6 per cent. (against 4 per cent.) on the ordinary shares for 1932. The shares of the holding company are entitled to the same rate of dividend as the shares of the operating company.

La Plata Electric Tramways Co. reports gross receipts for 1932 of £123,261, as against £121,672 in 1931, and expenses of £101,993, leaving net receipts of £21,268. From this are deducted exchange loss and debenture interest, leaving £14,042, which with £15,611 brought in makes £29,653. Renewals reserve receives £12,946 and £17,653 is carried forward. Meeting: May 23rd.

The Iron Trades Employers' Insurance Association, Ltd., reports a premium income of £524,576 for 1932, which with £98,684 brought in makes a total of £642,637. Compensation and incidental expenses totalled £365,205, and after providing for management expenses, &c., there is a balance of £214,084. It is proposed to return 15 per cent. of the workmen's compensation premium paid for 1932, together with a bonus of 15 per cent., on which income tax has already been paid.

The Shanghai Electric Construction Co., Ltd., reports a profit for 1932 of £115,511, as compared with £167,492 in the preceding year, to which is added £37,516 brought in, making £153,027. After providing for renewals (£30,000), taxation (£30,000), and contributing £2,208 to the Shanghai staff provident fund, it is proposed to pay a final dividend of 7 per cent., making 11 per cent. for the year (against 12½ per cent.), and to carry forward £24,819.

The Direct Spanish Telegraph Co., Ltd., reports that after providing for the whole expenditure during 1932, which includes £3,973 for gratuities to retiring staff and £4,036 for debenture interest, and adding £1,990 brought in, there is a debit balance for the year of £2,028. A sum of £10,000 is transferred from the contingencies fund, and a dividend of 6 per cent., less tax, is paid on the ordinary shares, leaving £1,093 to be carried forward. Meeting: May 23rd.

The Delhi Electric Supply & Traction Co., Ltd., reports a net profit for 1932 of £44,944, which with £21,052 brought in makes £65,996 available. As announced in our last issue the final dividend is 8 per cent., making 12 per cent., tax free for the year, leaving £20,633 to be carried forward.

The Chloride Electrical Storage Co., Ltd., recommends a final dividend of 6 per cent., less tax, on the "A" and "B" ordinary shares, making 12 per cent., less tax, for the year (against 10 per cent., tax free).

The Electrical Finance & Securities Co., Ltd., recommends a final dividend of 5 per cent., and a bonus of 2½ per cent. on the ordinary shares, making the total distribution for the year 12½ per cent. (same), less tax.

Siemens Bros. & Co., Ltd., have announced a final ordinary dividend of 4 per cent., making 6½ per cent. for the year (against 7½ per cent. for 1931).

Richard Johnson & Nephew, Ltd., have declared a dividend of 7 per cent. for the year on the ordinary shares (same).

Ward & Goldstone, Ltd., have announced a dividend of 7 per cent., less tax, for the year on the ordinary shares.

Stocks and Shares

TUESDAY EVENING.

THE investor of the present day can scarcely complain that his money matters give him no cause for liveliness of interest. He is liberally treated, indeed, to alternate sentiments of financial satisfaction and regret. That kaleidoscope to which reference has been made on various previous occasions in this column is presenting each week, almost each day, fresh and unexpected designs, whose practical reflection is seen on the quotations for money stocks and shares. After the American refusal to meet obligations in gold there has come a still more flagrant case of the same sort from Germany, with the result that confidence in Continental finance has been sharply shaken. Stocks and shares connected with Germany and Middle Europe have felt the full force of Germany's unexpected refusal to meet her bond obligations. The investor who has put money into foreign securities that he considered reasonably safe is left wondering whether his judgment is to be proved sound or far from it.

The course of American and Canadian prices has been erratic. One day, New York will be a strong supporter of utility and railway stocks; on the next day there is an obvious reluctance on the part of buyers to take what is offered. In these circumstances it is natural that prices of British industrials, considering the safety that the latter offer, should remain very firm.

Money Stocks Decline

Amongst the outstanding features is the way in which the prices of gilt-edged securities have been falling, on account of the impression, now very popular, that "money stocks," as these are called, provide ample scope for depreciation at the present high range of values. It has been reiterated here, perhaps to the point of monotony, that capital, finding it impossible to obtain profitable employment from banks or business opportunities, has been forced into safety-first securities until the yields on the latter range from 3 to 4½ per cent., the best class ordinary shares, such as those in the home electrical group, paying less than 4½ per cent. on the money. For some intangible cause, the buying of such safety-first stocks and shares has now stopped. Prices are going back, and, for

the moment, financial fashion runs eagerly upon the ordinary shares of industrial concerns. To such lengths has this policy now been carried that prices of ordinary shares are higher now, in some instances, than they have been for many years.

Electricity Supply

From the weakness which has overtaken investment stocks and shares, prices in the electrical markets have been free. In fact, the 4½ per cent. debenture stock of the London & Home Counties Joint Electricity Authority is a point to the good at 108. None of the ordinary shares in the Home Electricity Supply group shows material alteration. North Metropolitan Electric 6 per cent. preference are 6d. down at 29s. 6d. The London and Home Counties Authority has been somewhat in the limelight owing to the failure of its effort to purchase the Caterham distributing undertaking. The County of London Electric Supply Company, and other bodies, opposed the proposed purchase, and, incidentally, launched a barb at the expenses of the Joint Authority, which, according to the taunt, are unduly high.

North Metropolitan new shares are better at 18s. premium; the old shares moved up to 57s. 6d. Llanelly new preference hold their premium of 4½d. West Gloucestershire ordinary rose to 63, a gain of 3. Atlas, in the miscellaneous group, are a shilling lower at 8s. British Power & Light strengthened to 17s. 9d. Amongst the Indian shares, Calcutta Electric have gone back 1s. to 51s. Tokyo sixes at 76½ are down a point.

Home Railway Stocks

After the activity of the past few weeks, the Home Railway market has become a little quieter, but prices of the Undergrounds are maintaining the popularity which they recently achieved. Districts are up a point at 67½. Underground Electric ordinary strengthened to a guinea. The Central London assented and non-assented stocks hold their rises of last week. Metropolitan is a little easier at 73. Amongst the other London transport issues no particular changes have occurred. London & Suburban Traction keep firm at 17s. 6d., London United Tramway debenture holds its rise at 75½.

The London Passenger Transport Bill having now become law, investment attention is directed to the stocks and shares of those companies that come within the purview of the Act, and whose securities will be changed in due course for those of the new authority.

Cables and Wireless

Cables & Wireless stocks had been going ahead, but in a general malaise which occurred in the markets on Monday in this week, due to a scare over the possibility of war in Germany, prices relapsed with others of speculative character. Most of the fall was recovered, however, and prices show gains on balance, the preference being 3 higher at 85½. The Marconi Wireless Telegraph Company, which is, of course, part of the Cables & Wireless combine, announces a net profit of £74,735 for 1932, an improvement of £14,700 as compared with the previous year. The dividend on Marconi shares is maintained at 2 per cent. The meeting is to be held on Tuesday in next week. Anglo-American Telegraph preferred strengthened to 104. Globes have been in request; the ordinary rose 10s. to 12 before profit-taking reduced the price to 11⅞. The preference shares at 11⅞ show a rise of 2s. 6d. American Telephone & Telegraph recovered 5 points to 132½, while International Telephone & Telegraph at 15¾ are 1¼ up on the week.

Manufacturing and Equipment

The trend in this market is a little undecided. General Electrics improved to 42s. 6d., and Ever-Ready shares are 9d. better at 28s. 9d. English Electric preference improved to 12s. Associated Electrical Industries are stronger at 17s. There are no quotable changes in British Insulated, Callender's, Enfields and Henley's. Philips Incandescent Lamp Works show an increased profit for 1932, and the dividend is raised from 4 per cent. to 6 per cent. The directors propose to reduce the ordinary share capital by returning a part of it to the proprietors. The price of the shares, of 10 florins nominal, is 32s. 6d. Electrical Finance & Securities has declared a dividend of 5 per cent., and bonus of 2½ per cent., making altogether 12½ per cent., the same as that paid in 1931. The price of the ordinary shares is about 61s., and the 7 per cent. preference stand at 29s. 6d.

Miscellaneous Matters

The dollar stocks have been moving upon erratic lines. Consolidated Gas & Electric of Baltimore shares are 5 higher at 70. Montreal common receded to 37½, Canadian General Electric preferred hardened to 57½, a rise of 2. Power Corporation of Canada at 12 and British Columbia Power A at 23½ are both down, but Shawinigan Water advanced to 15½. These examples illustrate the curiously contradictory character of market movements.

Rubber shares display a hardening tendency; the price of the produce rose to 3¼d. per lb., but could not maintain the advance. Iron & steel shares have been better. Babcocks at 33s. 9d. are ⅛ up; the price touched 35s. last week. Amongst other groups, Electric & Musical Industries ordinary have had a good rise to 13s.; the 6 per cent. cumulative preference, carrying a year's arrears of dividend, are quoted at 16s. 3d. middle.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1931.	1932.	Price, May 16.	Rise or Fall.	Yield. p.c. £ s. d.
Home Electricity Companies.						
Bournemouth and Poole	1	15	15	75/-	—	4 0 0
Brompton Ordinary	1	8½	7	32/6	—	4 6 2
Central Electricity 4½% Deb.	Stock	4½	4½	108	—	4 3 4
Charing Cross Ordinary	1	8½	7	33/6	—	4 3 7
Chelsea	1	8½	7	32/6	—	4 6 2
City of London	1	10	10	33/6	—	4 3 7
Clyde Valley	1	7	7	35/-	—	4 0 0
County of London	1	10½	10½	53/9	—	3 18 8
Edmundsons' 7% Pref.	1	7	7	30/6	—	4 11 10
Elec. Dis. Yorkshire	1	9	9	45/9	—	3 18 7
Elec. Supply Corporation	1	11	11	65/9	—6d.	3 7 0
Kensington Ordinary	1	8	7	33/-	—	4 4 10
Lancs Light and Power	1	7	7	32/6	—	4 6 2
London & Home Counties 4½% Deb.	Stock	4½	4½	109	+1	4 3 4
London Electric	1	9	7	32/6	—	4 6 2
Metropolitan	1	10	10	51/3	—	3 18 2
Midland Counties	1	7	7	35/-	—	4 0 0
Mid. Elec. Power	1	8	8	38/9	—	4 2 6
North Eastern Electric Ordinary	1	6	6	30/-	—	4 0 0
Do. 7% Pref.	1	7	7	33/-	—	4 4 10
Northampton	1	10	10	51/3	—	3 18 2
Notting Hill 6% Pref.	10	6	6	13½	—	4 10 7
North Met. Elec. 6% Pref.	1	6	6	29/6	—6d.	4 1 4
St. James' and Pall Mall	1	8	7	32/6	—	4 6 2
Scottish Power	1	8	8	36/3	—	4 8 2
South London	1	8½	7	33/-	—	4 4 10
Urban Ordinary	1	7	7	37/6	—	3 14 8
Westminster Ordinary	1	8½	7	32/6	—	4 6 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	17/6	—	8 11 2
Yorkshire Elec.	1	8	8	43/3	—	3 14 3
Home Rails.						
Central London Ord. Assented	Stock	4	4	87½	—	4 11 5
Metropolitan	,,	2½	1⅝	73	—1	2 4 6
Do. District	,,	4½	3	67½	+1	4 9 0
Underground Electric	1	7	4½	21/-	+6d.	4 5 10
Telegraph and Telephones.		1930	1931			
American Tel. & Tel.	$100	9	9	132½	+5	6 15 0
Anglo-Am. Tel. Pref.	Stock	6	6	104	+½	5 15 5
Do. Def.	,,	1½	1½	24	—	6 2 5
Cables & Wireless 5½% Pref.	,,	5½	2¾	85½	+3	3 4 4
Do. A 7½% Ord.	,,	—	Nil	29	+1	—
Do. B Ord.	,,	—	Nil	12	+1½	—
Globe Tel. and T. Ord.	10	8½	Nil	11⅛	+⅛	1 14 1
Do. do. Pref.	10	6	6	11⅞	+⅛	5 1 1
Great Northern Tel.	10	20	20	28½	+½	7 0 4
Marconi-Marine	1	15	10	28/9	—	5 4 4
Oriental Telephone Ord.	1	12	12	3	—	*4 0 0
Home and Foreign Trams, Etc.						
Anglo-Arg. Trams First Pref.	5	—	—	1/9	—	—
Do. do. 2nd Pref.	5	—	—	1/9	—	—
Do. do. 5% Deb.	Stock	—	—	7½	—	—
British Electric Traction Def. Ord.	,,	5	5	275	+20	—
Do. do. Pref. Ord.	,,	8	8	134	+1	5 19 5
Brazil Traction	100	—	—	13½	+2½	—
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	102½	—	4 19 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	17/6	—	—
London United Tram Deb.	Stock	4	4	75½	—	5 6 0
Mexico Trams, 5% Bonds	—	5	5	27½	+1	18 3 8
Mexican Light Common	100	Nil	Nil	11½	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	64½	—	7 15 0
Victoria Falls Ord.	1	15	15	4¾	—⅛	3 10 7
Yorkshire (West Riding)	1	Nil	Nil	6/-	—	—
Manufacturing Companies.						
Assoc. Elec. Ord.	1	6	4	17/-	+⅛	4 14 2
Do. Pref.	1	8	8	27/6	—	5 16 4
Babcock & Wilcox	1	14	14	33/9	+⅛	5 6 6
British Aluminium Ord.	1	10	5	26/3	—	3 16 0
British Insulated Ord.	1	15	15	67/6	—	4 9 3
Brush Ord.	Stock	5	Nil	40	—	—
Callender's	1	15	15	2⅞	—	5 4 2
Do. 6½% Pref.	1	6½	6½	28/9	—	4 10 5
Crompton Parkinson Ord.	5/-	30	24	21/6	—	5 2 4
Do. 8% Pref.	1	8	8	32/-	—	5 0 0
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	11/3	—	—
Enfield Cable Ord.	1	25	25	4¾	—	5 11 1
English Electric	1	Nil	Nil	7/6	—	—
Do. do. Pref.	1	Nil	Nil	12/-	+9d.	—
Ever Ready	5/-	35	35	28/9	+9d.	6 1 9
Ferranti Pref.	1	7	7	24/-	—	5 16 8
G.E.C. Pref.	1	6½	6½	29/9	—	4 7 5
Do. Ord.	1	10	8	42/6	+⅛	3 15 3
Henley's	1	30	30	6	—	5 0 0
Do. 4½% Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber	1	Nil	Nil	2/6	—	—
Johnson & Phillips	1	10	5	18/3xd.	—	5 9 7
Siemens Ord.	1	7½	7½	26/3	—	5 0 0
Telegraph Construction	£1	Nil	Nil	18/3	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1931

20401. "Apparatus for attenuating sound-waves by resonance." General Motors Research Corporation. July 25th, 1930. (391180.)

23582. "Electric motor control systems." General Electric Co., Ltd., and H. J. Coates. August 21st, 1931. (391182.)

28324. "Electromagnetic relay arrangements." Akt.-Ges. Brown, Boveri et Cie. June 1st, 1931. (391173.)

28525. "Motor vehicle electric lamps." J. Lucas, Ltd., and O. Lucas. October 14th, 1931. (391117.)

28583. "Electric cable clamps." J. G. Miller and Bullers, Ltd. October 14th, 1931. (Addition to 351062.) (391185.)

28598. "Automatic switches for use in telephone or like systems." Automatic Electric Co., Ltd., and R. N. Saxby. October 14th, 1931. (391123.)

28606. "Means for assembling the pole pieces within the body part of a dynamo-electric machine." J. Lucas, Ltd., and F. H. Leffler. October 15th, 1931. (391124.)

28725. "Protective arrangements for sectionalised electric power circuits." A. Reyrolle & Co., Ltd., H. W. Clothier, B. H. Leeson, and H. Leben. October 15th, 1931. (391134.)

28726. "Electric relays and their use in electric protective or other systems." A. Reyrolle & Co., Ltd., and H. Leben. October 15th, 1931. (391135.)

28818. "Lights for aeroplanes and other aircraft." P. F. Lester. October 16th, 1931. (391138.)

28827. "Electric phonograph reproducers." Electrical Research Products, Inc. December 12th, 1930. (391139.)

28851. "Electric motor control systems." International General Electric Co., Inc. October 16th, 1930. (391186.)

29318. "Electrical signal wave transmission systems." Electrical Research Products, Inc. November 4th, 1930. (Addition 338973.) (391211.)

29377. "Directional aerials and apparatus for use therewith." Marconi's Wireless Telegraph Co., Ltd., and H. A. Ewen. October 22nd, 1931. (391219.)

29394. "Electric fuses." J. E. Pollak (Schweitzer & Conrad, Inc.). October 22nd, 1931. (391220.)

29442. "Electric power cables" Standard Telephones & Cables, Ltd., and T. R. Scott. October 23rd, 1931. (391222.)

29444. "Telegraph systems." Creed & Co., Ltd., and R. G. Griffith. October 23rd, 1931. (391223.)

29476. "Protective-devices for electric distribution systems." International General Electric Co., Inc. October 23rd, 1930. (391225.)

29901. "Electric time-delay relay apparatus." British Thomson-Houston Co., Ltd. October 28th, 1930. (391232.)

31258. "Means for supporting electric trolley arms, or the like on vehicles." Park Royal Coach Works, Ltd., and A. T. Froggatt. November 11th, 1931. (391237.)

31890. "Electric machine drives." International General Electric Co., Inc. November 17th, 1930. (391239.)

33913. "Electric drives for rotary machines." International General Electric Co., Inc. December 6th, 1930. (Addition 391239.) (391246.)

34019. "Electric heaters for use in hair waving." M. S. Colson and L. L. Colson. September 3rd, 1931. (391247.)

34350. "Coupling link or bar for electrical terminals." Veritys, Ltd., and W. G. Pipkin. December 11th, 1931. (391249.)

35515. "Wireless signalling systems." Siemens & Halske Akt.-Ges. December 23rd, 1930. (391254.)

1932

1044. "Distributing-frames in telephone systems." Siemens Bros. & Co., Ltd., and S. S. Danks. January 13th, 1932. (391261.)

4384. "Insulating electric connectors." W. T. Henley's Telegraph Works, Co., Ltd., and E. Moor. February 18th, 1932. (391282.)

5361. "Electric motors." Akt.-Ges. Brown, Boveri et Cie. February 23rd, 1931. (391285.)

5715. "Electrical socket-couplings, adaptors, and the like." J. A. Crabtree, and B. G. Harrison. February 26th, 1932. (391288.)

5935. "Electrical switchgear." Electrical Apparatus Co., Ltd., and J. R. Walton. February 27th, 1932. (391290.)

6389. "Electrical pick-up device for attaching to musical instruments." H. T. Morgan. March 3rd, 1932. (391292.)

6865. "Multiple filament electric incandescent lamps." T. Oberstenfeld and K. Berster. March 7th, 1932. (391293.)

7446. "Flash-light lamps and the like, and the manufacture thereof." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. May 5th, 1931. (391298.)

8777. "Electric lamp shades." P. Webber. March 24th, 1932. (391300.)

13071. "Operating and indicating mechanism for variable electric condensers and other instruments for wireless and and similar purposes." Wilkins & Wright, Ltd., and J. H. Hewitt. May 6th, 1932. (391318.)

14491. "Electric switches." International General Electric Co., Inc. May 21st, 1931. (391323.)

19277. "Current-closing device for electric motors used with striking clocks." F. Schneider. October 17th, 1931. (Divided application on 28917/31.) (391150.)

19713. "Electric tubular furnaces." L. Mellersh-Jackson. (Siemens Schuckertwerke Akt.-Ges.) July 12th, 1932. (391339.)

19859. "Microphone transmitters." Marconi's Wireless Telegraph Co., Ltd. July 13th, 1931. (391340.)

23941. "Electric circuit breakers." British Thomson-Houston Co., Ltd. August 26th, 1931. (391358.)

24118. "Cathode ray tubes." Telefunken Ges. für Drahtlose Telegraphie. August 29th, 1931. (391360.)

29409. "Automatic switches for use in telephone or like systems." Automatic Electric Co., Ltd., and R. N. Saxby. October 14th, 1931. (Divided application on 391123.) (391151.)

29753. "Automatic gain control systems for use in radio and like receivers." Marconi's Wireless Telegraph Co., Ltd. October 23rd, 1931. (391373.)

30169. "Alternating-current signalling systems." L. E. Ryall. October 15th, 1931. (Divided application on 23871/31.) (391152.)

30364. "Flywheel lighting and ignition magnetos." R. Bosch Akt.-Ges. June 3rd, 1932. (391379.)

33642. "Valve circuits for radio transmission." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. December 10th, 1931. (391392.)

33688. "Signalling apparatus." Submarine Signal Co. January 29th, 1932. (391393.)

35755. "Surge indicators." International General Electric Co., Inc. December 16th, 1931. (391401.)

36311. "Luminous electric discharge tubes." Claude-General Neon Lights, Ltd. December 22nd, 1931. (391403.)

36929. "Electric arc welding apparatus." British Thomson-Houston Co., Ltd. December 31st, 1931. (391408.)

1933

1964. "Wireless heterodyne reception." Dr. G. Seibt Akt.-Ges. January 20th, 1932. (391411.)

2062. "Electric washing machine for cleaning fabric or other woven material. J. Lehmkuhl. February 2nd, 1932. (391412.)

2876. "Combined pneumatic and electric conductors." Aktiebolaget Separator. January 30th, 1932. (Addition to 318244.) (391413.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from May 10th.

Epok. No. 540107. Class 1. Synthetic resins.—British Resin Products, Ltd., Portland Road, Kingston-on-Thames.

Drivermu. No. 540200. Class 8. Electric transformers for use in connection with radio-telephonic receiving sets.—Radio Instruments, Ltd., Purley Way, Croydon.

Blue Circle (lettering and design). No. 537561. Class 8. Radio and television transmitting and receiving apparatus and parts thereof, thermionic valves, loud speakers, telephones, electric dry cells and accumulators (not for medical purposes), and radio receiving apparatus operated in connection with, or combined with, talking machines, mains disturbance eliminators, and wave traps for radio receiving sets.—British Blue Spot Co., Ltd., 95-96, Rosoman Street, Rosebery Avenue, E.C.1.

Expreso. No. 439682. Class 13. Electric lighting, heating and power fittings.—General Accessories Co., Ltd., 18-22, Euston Buildings, George Street, N.W.1.

Shotweld. No. 538053. Class 18. Electric welding apparatus.—Pressed Steel Co. of Great Britain, Ltd., Cowley, Oxford.

Lustilac. No. 536787. Class 50. Compositions mouldable under heat and pressure made from condensation products of phenol and formaldehyde, synthetic resin, casein, cellaloid or fibre pulp, and articles made from such compositions.—Joseph Lucas, Ltd., Great King Street, Birmingham.

Ceylon's Electrical Imports

THE following table shows the value of Ceylon's imports during last year. The figures have been taken from the official trade returns. Notes of increases and decreases are added for purposes of comparison. The par value of the rupee is about 1s. 6d. It will be seen that on the whole there was a considerable decline in this trade.

	1932. Thous. Rs.	Inc. or dec. as compared with 1931. Thous. Rs.
Control and switchgear †—		
Total	39	− 65
Radio instruments and apparatus—		
Total	77	− 5
From United Kingdom	41	+ 6
„ Germany	26	+ 2
„ Holland	5	− 8
Other telegraph and telephone instruments—		
Total	29	− 119
From United Kingdom	27	− 117
„ Sweden	—	− 1
Lighting accessories, fittings and switches—		
Total	282	− 256
From United Kingdom	112	− 89
„ Germany	39	− 45
„ Holland	18	− 21
„ Japan	17	+ 6
„ United States	60	− 118
Batteries, dry—		
Total	157	‡
From United Kingdom	7	‡
„ United States	125	‡
Other batteries and accumulators—		
Total*	21	‡
From United Kingdom	18	‡
Elec. goods and apparatus not elsewhere specified—		
Total	296	+ 29
From United Kingdom	264	+ 22
„ Germany	16	+ 5
„ Holland	4	+ 2
„ United States	2	− 5
Transformers and convertors—		
Total	27	—
From United Kingdom	23	− 4
„ United States	2	+ 2
Generators and alternators—		
Total	67	− 41
From United Kingdom	54	− 51
„ United States	10	+ 9
Motors—		
Total	82	− 18
From United Kingdom	73	− 4
„ United States	9	− 13
Elec. machinery not elsewhere specified—		
Total	91	− 178
From United Kingdom	62	− 134
„ Germany	15	+ 4
„ Italy	—	− 11
„ United States	11	− 38
Insulated wires and cables—		
Total †	172	− 251

* Not for motor vehicles. † Mainly from U.K.
‡ Not specified.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aylesford (KENT).—Houses (24); W. H. Simmonds, builder, Wrotham.

Basingstoke.—Weights and measures offices, New Road, for C.C.

Bath.—Reconstruction of business stores, Union Street (electrical work and lifts), for James Colmer, Ltd. (£50,000); J. Long & Sons, contractors.

Bedlington.—Houses (70), Millbank site; J. W. Pooley, U.D.C. surveyor.

Bexhill-on-Sea.—Shops, Buckhurst Road; T. Wallis, builders, Eastwood Road.

Biggleswade (BEDS).—Houses (42); F. C. Levitt, R.D.C. architect, Market Square.

Bishop Middleham (DURHAM).—Houses (200); G. W. Lazenby & Son, builders, Ferryhill.

Blyth.—Infants' school, Princess Louise Road; L. Leeper, borough engineer, Municipal Buildings.

Bolton-on-Dearne (YORKS).—Houses (50); U.D.C. surveyor.

Burton-on-Trent.—Senior school (£27,232); director of education.

Carlisle.—Rehousing scheme (£16,347); city engineer, Estate development, Brampton Road; H. E. Scarborough, architect.

Catterick Camp (YORKS).—Houses (200), Walkerville Estate; C. Walker, York.

Cheltenham.—Houses (49), Alstone Lawn Estate; Copp Bros., Ltd., builders.

Cheshire.—Extensions, Verdin Technical College, Northwich (£4,460), and school, Blacon; Mr. Browne, county architect, Chester.

Clackmannanshire.—Primary school, Alloa (£15,000); clerk, County Education Committee.

Colchester.—Houses (46), Ipswich Road; borough engineer.

Consett (DURHAM).—Houses (120); J. J. Eltringham, architect, Blackhill.

Coventry.—Elementary school, Hen Lane Estate, for E.C.

Crowle.—Houses (20); C. Proctor, builder.

Croydon.—Houses and flats (110), Old Town area, Waddon and Beddington, and firemen's quarters, Long Lane (£3,500); borough engineer. Church, Hatch Road; Murrell & Pigott, 44, Bedford Row, W.C. Junior school, Church Road, Shirley (£3,225), for E.C.

Darenth.—Hospital block training colony (£13,370); L.C.C. architect.

Derby.—Church, Spondon, with electric lighting installation (£6,000); A. Brocklehurst & Co., architects, Norfolk Street, Manchester.

Derbyshire.—School, Doe Lea; G. H. Widdows, county architect, County Offices, Derby.

Droitwich.—Houses (38); borough surveyor.

Droylesden.—Houses (300), Manchester Road; William Chappell & Sons, Ltd., builders, The Roose, Folly Lane, Swinton Lanes.

Dudley.—Shops and flats, New Street; F. H. Gibbons, borough engineer.

East Lothian.—Golf club factory, Gullane; J. Wightman and Douglas, Alnwick.

Essex.—Schools, Rainham and Wickford, and extensions, Grays Road School, Orsett (£12,000); county architect, Chelmsford.

Gartcosh (GLASGOW).—Estate development; R. & J. Chapman.

Gillingham.—Houses (20), Barnsole Avenue; F. Parham, builders, Canterbury Street.

Glasgow.—Houses, Knightswood (128) and Summerton Road (12); housing director and trade contractors. Extensions, marine police quarters (£5,000), and improvements to city halls (£6,000); city engineer.

Halifax.—Garages for Economic Stores (Halifax), Ltd., King Street; Thos. Pickles, builders, Turn Lea, Midgley, Luddendenfoot. Science laboratories, Heath Grammar School (electrical and heating work); D. T. Lloyd Jones, borough engineer.

Hampshire.—Mental hospital extensions, Tatchbury (£20,000), and school extensions, South Hayling (£6,500), for County E.C.

Handforth.—Houses (120), Bolshaw Road; J. E. Davies, builder, Bolshaw Road.

Haywards Heath.—Houses (20); H. White, builder.

Hebburn-on-Tyne.—Houses (100), Hedgeley Road; T. A. Page and Sons, U.D.C. architects, 67, King Street, South Shields.

Hemel Hempstead.—School, for borough E.C.; Major Maule, architect.

Huddersfield.—Church, Thornton Lodge; A. A. Kellett, architect.

Irish Free State.—(CASTLEBAR, Co. MAYO).—Houses (80); T. P. McDonough, architect, Courthouse. (TRALEE, Co. KERRY).—Houses (178); O. G. Tough, town surveyor.

Isle of Wight.—Secondary school extensions, Newport; director of education, Newport.

Kent.—Two schools, Bexley; county architect, Maidstone.

Kirkintilloch.—Houses (68); burgh surveyor.

Lanarkshire.—School, Cambuslang; J. Stewart, county architect, 20, Albert Street, Motherwell.

Lincoln.—Houses (40), St. Giles' Estate; city surveyor.

Lincolnshire.—School, Stamford (£11,500); reconditioning Sleaford Institution (£22,000); casual wards, Sleaford (£7,000) and Stamford (£3,000); nurses' home, Grantham, and children's homes (£4,000); county architect.

London.—(BROCKLEY).—Rebuilding, 32-4, Brockley Park; A. Casse. (CAMBERWELL).—Blocks of flats, Shard Road; W. H. Woodruffe & Son. Town hall extensions (£50,000); Culpin & Bowers, architects. (DEPTFORD).—Houses (128), Marquis Estate, St. Denats Road; G. T. Harman, High Street, S.E.13. (EALING).—Houses (248), Empire Road, &c.; Swannell & Sly, architects, High Street, Rickmansworth. Houses (29); Beaufort Road; Haymills, Ltd. Houses (20), Cavendish Avenue; G. K. Metcalfe, Ltd. Houses (20), Church Road; Grainger Bros. Block of flats, Hastings Road; Housing Corporation of Gt. Britain, Ltd., 50, Pall Mall, S.W.1. Film studio, Aintree Road, and factory, for Messrs. Suflex, Ltd.; Percy Bilton, Ltd., 113, Park Street, W.1. Milk distribution depôt, near Ruislip Road; Express Dairy Co., Ltd. Four shops and flats, Broadway, Ruislip Road; E. R. Taylor, architect, 5, Manchester Square, W.1. Nine shops and flats, Hanger Lane; T. P. Bennett & Son, architects, 41, Bedford Row, W.C.1. Reconstruction of St. John's schools; trustees. (EAST HAM).—Rehousing, Gooseley Estate (£32,500); borough engineer. (HERNE HILL).—Buildings extensions, adjoining Congregational Church; Rees & Partners. (LEE).—Houses (144), Manor Lane Estate; Manor Estates, Ltd. Rebuilding, 20, Upwood Road; Thomas Allen (Lee), Ltd. (LEWISHAM).—Houses (33) and shops (4), Brockley Road; H. Macintosh. Rebuilding Pavilion, Rutland Road; Rogers & Rogers. (SILVERTOWN).—Factory extension, Factory Road; Bateman, Loders & Nucholine, Ltd. (SOUTHWARK).—Town hall, for B.C. Committee. (SYDENHAM).—Development of Peak Hill Lodge Estate; Brett & Son.

Middlesbrough.—Houses (60), various sites; Lofthouse & Son, architects, 129, Albert Road.

Moray.—Hospital for Moray and Nairn (£16,760); Colonel Ian K. Thomson.

Morecambe.—Extensions, Westgate Works, for Souplex, Ltd. (electrical installations); Edmondson Bros. (Morecambe), Ltd., builders, Main Street.

Mottingham.—Estate development; Chislehurst Estates, Ltd.

Norbury (SURREY).—Houses (40), Ockley Road; Wates (Streatham), Ltd. Church, St. Oswald's Road; St. Oswald's Church Council.

Northampton.—Fire station, Campbell Square (£30,423); Henry Martin, Ltd.

Norwich (CHESHIRE).—Houses (50), Danefield Estate; F. L. James, U.D.C. surveyor.

Nottinghamshire.—Junior school, Sutton-in-Ashfield (£6,450), for County E.C

Oxfordshire.—School (100 places), Forest Hill, for County E.C.

Paignton.—Houses (23), Preston Down Road; Great Western Building Corporation, Ltd.

Penrith.—Cinema, Middlegate, for the Alhambra Theatre and Picture House Co.; G. H. Fawcett, architect, York Place, Scarborough.

Perivale.—Houses (302) for Hillingdon Estate Co.; Swannell & Sly, architects, High Street, Rickmansworth.

Perthshire.—School, Scone (£35,000); clerk, County E.C., Perth.

Portsmouth.—Houses (100); Victory Housing Society, Ltd. Baths, Hilsea (£36,500); borough engineer. Bus depôt, London Road, Hilsea; Southdown Motor Service, Ltd. Cinema, Cosham; Carlton Cinema Co.

Reading.—Pavilion for patients, Park Hospital (£2,500); W. R. Howell, architect, 17, Blagrave Street.

Romford.—Houses (74); Romford and District Estates, Ltd. Houses (50), Eaton Drive; Martins Estates, Ltd.

Rutherglen.—Shops and houses (£4,000); E. Penman, Sub-Dean of Guild.

Scarborough.—Shop, Newborough; M. Burton, Ltd.

Shotwick (CHESHIRE).—Houses, &c. (£5,620); T. Warrington & Sons.

Solihull.—Sessions house (£7,599); H. B. Tarleton, Redditch.

Southend-on-Sea.—Workhouse extensions (£5,600); borough engineer.

South Shields.—Houses (32), Coleridge Avenue; M. Swales. Houses (18), Warwick Road; J. R. Henderson. Houses (18), Wyngarth Estate, Harton; T. A. Page & Son, architects. Houses (40), near Sutton Housing Scheme, and additions to Harton Hospital; J. P. Watson, borough engineer, Town Hall.

Stockport.—Houses (138), Kay's Fields, Turncroft Lane (electrical installation); W. G. West, builder.

Stockton-on-Tees.—Houses (22), Craigwell Crescent; A. McLeod, Ltd. Houses (22), Grosvenor Road, &c.; G. P. Stainsby, architect, 25, High Street. Development of Craigwell Estate; C. W. Cummings, architect, 77, Merrydale Avenue.

Stretford.—Assembly hall, Longford (£3,000); U.D.C. surveyor.

Sunderland.—Swimming baths, Newcastle Road (£30,000); T. P. Collinge, borough engineer, Town Hall.

Swansea.—Flats, Carmarthen Road; Bennett Bros. Church, Dyfed Avenue, Townhill; Congregational trustees.

Swindon.—School, Pinehurst, for E.C.

Thornton Heath (SURREY).—Houses (75), Thornton Avenue; Thomas & Son, Station Approach, Chipstead.

Truro.—Swimming bath, Sunny Corner; city engineer.

Tyldesley.—Houses (80), Mossley Common, with electric lighting installation (£21,849); R. & W. Gregson, builders, Milk Street.

Wallasey.—School, Oakdale Road, for E.C.

Warwickshire.—Junior school (400 places), Shirley site, Solihull; county architect.

West Malling (KENT).—Development of Temple Farm Estate; Economic Housing Association, Ltd.

West Sussex.—Operating theatre, Southlands Hospital (£6,000), and electric lighting installation, Steyning Institution (£3,000), for P.A.C.; clerk, Lewes.

Woodstock (OXFORD).—School; Educational Foundation of Sir Robert Cocks.

Worcestershire.—Senior schools, Evesham and Stourport; also police cottages, various towns (£13,000); county architect, Worcester.

York.—Extensions, Public Library (£3,500); P. J. Spalding, town clerk.